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Original Communications

RADICULITIS AND NEURITIS CONTRASTED.*

By TOM A. WILLIAMS, M. B., C. M., Edin.,
Washington, D. C.

Both these terms are misnomers, as inflammation is not necessarily present in either of the clinical states known as neuritis and radiculitis.

Although localized inflammation of the spinal roots had already been found post mortem in 1896, by Dejerine and Thomas, and although the syndrome radiculitis had in the meanwhile become recognizable and has been intensively studied, principally in Dejerine's Clinic ever since, very little attention has been given it in America except on the part of a few neurologists. In the presentation which follows, I have permitted myself to extend somewhat the very strict interpretation by Dejerine of the term radiculitis. Although he later admitted that tabes dorsalis was merely the consequence of degeneration of the posterior roots, he did not include that syndrome in that of radiculitis. He also excluded those affections of the roots caused by neoplasm or productive inflammation, and he did not consider at all the post-ganglionic implication of the trunk of the nerve by the spread of bony or articular inflammations or the pressure upon the nerve trunk by narrowed canals (neurodicitis). In this he was entirely justified; but as clinically neuronal irritation of the intervertebral foramen is, as regards the neurological signs, indistinguishable from radicular irritation itself, I have taken it upon myself to include in the consideration of radiculitis the trunculitis caused by ostearthritis of the spine. Furthermore, I have not excluded disorders because of their symmetricality, progressiveness, nor do I see reason to refuse to accept in the radicular syndrome cases where the sphincters are involved, when it is by lesion only of the lower sacral roots.

*Read at the fifty-second annual meeting of the Medical Society of Virginia, in Lynchburg, October 18-21, 1921.

The name NEURITIS was given because of the occurrence of pain, which led to the assumption that inflammation in the usual sense was the cause. Early studies of the pathology of nerves in this state seemed to confirm this, in that there was a disintegration of the nerve tissue; but this, when unaccompanied by serous exudates or infiltration of white cells, and when not followed by proliferation of connective tissue, cannot be legitimately entitled inflammation in the usual sense. What really happens is a *degenerative process*, which causes heightened irritability of the neurofibrils.

These remarks are equally true of the condition of the spinal roots known as radiculitis; for the syndrome may be caused by pressure merely. Many cases of so-called neuritis are merely instances of pressure also.

RADICULITIS may be defined as a clinical syndrome, the anatomcal basis of which is an interference with any portion of a spinal nerve between its emergence from the spinal cord and its leaving the intervertebral ganglion to constitute the peripheral nerve. That is to say that it is a *pre-ganglionic* affection, and may affect either the sensory or the motor root or both.

To post-ganglionic affections is given the name of *peripheral neuritis*, and these must necessarily implicate both sensory and motor constituents of a mixed nerve, although either of these may be functionally impaired in so slight a degree as to be clinically inconsiderable, as, for instance, in the case of lead poisoning, which is believed to affect the sensory far less than it does the motor elements.

In both radiculitis and neuritis, it is usually *pain* which leads the patient to seek advice; although in some cases, especially of anterior root disease, weakness and atrophy may be the only complaint. In neuritis, pain is always accompanied by *tenderness;* and this is more especially so of the *deep tissues*, although in some cases of polyneuritis, cutaneous hyperaesthesia too may for a time be excruciating. In the less obvious cases, firm pressure is required to elicit this sign. It is a most im-

portant one and is serving as one of the chief differentiations from radiculitis, in which there is no increase of tenderness, but, on the contrary, usually a decided diminution of the sense of pain on firm deep pressure. The explanation of this is that interference with a root only is distal to the trophic center, the intervertebral ganglion. Hence, there is no deterioration of the peripheral nerve, but merely an interruption of conductivity after the impulses reach the affected portion of the root.

It is true that in some cases of actual inflammation of the root, there may appear to be an increase of sensitivity to painful stimuli; but that is due to erethism of the inflamed tissue; it is of the same order as that found in meningitis.

Interference with conductivity of sensory impulses is present in both conditions. The differentiation has to be made by the distribution of the loss. To do this the distribution of each peripheral nerve as well as the overlap of contiguous nerves must be known. Particularly in the arm, this does not correspond with the zone of distribution of the spinal roots. The anesthesia may be exceedingly variable from day to day in cases due to radicular pressure; especially when that is caused by tubercular infiltrations or syphilitic exudates; for in both of these the reparative processes as well as the vascularization are most variable. This is also the case in some instances of tumor pressing upon the roots, although as a rule the symptoms are progressive with intermissions of only short duration.

The *different modalities of sensation* may be affected to different degrees. This may reach the extent of simulation of syringomyelia, more especially in tubercular disease of the meninges, where marked loss of pain and temperature conductivity may be scarcely accompanied by any impairment of the senses of touch and attitude. Strangely enough, the contrary is usually the case in syphilitic radiculitis, where before there is any considerable loss of pain and temperature sense, the attitude sense may be so impaired as to lead to an ataxia of locomotion.

The same syndrome may occur for a time in peripheral neuritis; but an increase of the deep pain sense in the latter enables the diagnosis to be made even without the presence of motor enfeeblement and atrophy, which usually occur along with the trophic changes known as glossy skin, and brittleness of the nails. This is the condition known as pseudo tabes.

Motor weakness and atrophy occur in both neuritis and radiculitis provided the anterior roots are implicated. This is particularly shown in meningeal tuberculosis, in which for a time it may be the only sign. But even in the syphilitic radiculitis, which leads to true tabes dorsalis, there occurs some degree of motor impairment through the anterior roots being affected also. The speedy repair of this through absorption of exudate and regeneration of fibers often prevents its detection, except in the case of the motor nerves of the eyeball, where the symptom of diplopia draws attention to it. It is fortunately now less common to have this empirically treated by prisms without investigation as to its cause and the direction of treatment to that.

In the limbs, the muscular atrophy may lead to *deformity* of the joints through contracture of the tendons unless precautions are taken, both in radicular and neural affections.

In the motor sphere the distinction between neuritis and radiculitis is again to be made by knowledge of the distribution of each root and peripheral nerve. The exact distribution of all the roots of the brachial plexus is not completely known; while the distribution of the peripheral nerves is well understood. Investigation of wounds of the plexus and roots during the war have permitted a delimitation of some doubtful distributions, more particularly of that of the sixth and seventh cervical roots. These have been embodied in a new schema of the plexus now exhibited, which shows that the triceps receives fibers only from the seventh root. Supinator longus is supplied by the sixth root only, whereas both are supplied by the musculospiral nerve. These situations apply, of course, only to a plexus which is neither preaxial nor postaxial in placement.

Hence, if only one of these muscles is paralyzed from a lesion in the neck, we can affirm this to be radicular and not peripheral; and, if surgical intervention is indicated, a dissection of the plexus will be avoidable, while a laminectomy may be required.

The reflexes furnish no differentiation between radiculitis and peripheral neuritis, as they are impaired in both conditions to a degree corresponding with the gravity of the lesion and its topography.

Trophic changes, as aforementioned, indi-

cate peripheral disease except in the case of perforating ulcer and Charcot joint, which may occur in tabes dorsalis; but even these are regarded as being provoked by persistent trauma tolerated by the patient because of anaesthesia preventing the forced rest which pain would otherwise compel. Modification of hair growth and of sweat production may occur in radiculitis also, this because the vasomotor fibers forming the rami communicantes run in the spinal root. These changes do not reach the degree seen clinically in peripheral neuritis, as a rule.

Pathology.—The pathology of the two conditions offers a striking contrast. The common sources of radiculitis are *syphilis* and *tuberculosis*, which almost never affect the peripheral nerves directly. In each case there is a pressure on the roots by the exudate which collects in the narrowing meningeal sheath during its reflection upon the spinal root as it passes toward the intervertebral foramen. Indeed, it is possible that the symptoms are less due to inflammation than to strangulation proper.

In neuritis, a *strangulation* pathogen also plays a part where a peripheral nerve is passing through a bony canal, as in the aqueduct of Fallopius, facial paralysis being perhaps the commonest of all, or through an aponeurosis such as the fascialata, neurodocitis.

But an even more important pathogen is *toxin;* for this may affect all the peripheral nerves and form the clinical picture of polyneuritis, which may even reach the degree of total paralysis. Fortunately, the cranial nerves and diaphram usually escape; although in the alcoholic variety the vagus may be so affected as to cause death.

The toxin from a *septic focus* may produce a neuritis, usually mild, often localized to the area through which the lymphatics drain the abscess, as then toxins pass up the nerve sheaths of the neighborhood. This mechanism has been experimentally proved. Neuritis, too, of an individual nerve, may occur in consequence of the general diffusion of toxin.

Systemic Diseases and the Peripheral Nerves and Roots.

That only a single nerve should be attacked by a process which is systemic in its disturbance is to be explained by local differences in the tissues around that nerve. Instances are afforded by the effects of previous trauma or disease and by interference with circulation through disturbance of vascular supply. But it is not always necessary to have recourse to these explanations; for the anatomical surroundings of certain nerves render them particularly vulnerable to pathological processes. The result is that quite a mild inflammation causing only a slight swelling, is capable of producing severe functional impairment of the nerve.

Again, while spinal roots are leaving their ganglion and passing through the inter-vertebral foramen, they are once more subjected to the risk of compression, either by a fibrositis of the lining of the canal or by bony compression through the giving way of the vertebra as a result of osteoporosis.

Many sciaticas and brachialgias are believed to originate in this region. The name neurodocitis has indeed been given to an inflammation produced in this way. Others have called the condition funiculitis.

Another locality where a nerve is liable to be affected is the situation where it penetrates the aponeurotic sheaths of the muscles of the deep fascia. Meralgia paraesthetica is the best known form of this condition.

While toxi-infectious conditions may be responsible for any of the foregoing syndromes, yet they do not seem to be essential; for in the majority of instances, where a neuralgic attack originates in one of these situations, there is no evidence whatever of the more acute type of intoxication.

There is, however, in many instances, evidence of *disordered metabolism.* This disorder is of the type which our predecessors called lithemia and which had within our own memory a great vogue as uric acid diathesis. The present writer attributes the majority of cases of this type to an impaired protein metabolism, for such patients show other signs attributable to metabolic disorder, either at the time of examination, subsequently, or in their former history. Furthermore, their antecedents and collaterals show numerous instances of the same disorder. The most conspicuous of these are increased arterial tension, nephritis, migraine, so-called chronic rheumatism, apoplexy. Patients of this kind have been called by French writers arthritic. The writer has found that cases within this category are rapidly and often permanently benefited by a diet which effects an improvement in the metabolism through prevention of pro-

tein overload, by favoring adequate heat production by means of sufficient carbohydrates and by facilitating tissue interchange through the provision of a sufficiency of fruit salines, whilst of course preventing all possible causes of metabolic stagnation, such as constipation, inactivity whether bodily or mental, and compensating any insufficiencies of glandular action when these are present. Treatment on these principles has benefited most of the cases of neuralgia which local treatment has failed to benefit and which are not attributable to lesions of mechanical or infectious origin.*

Another factor which enters into the pathogenesis of mild neuritis and neuralgia is endocrine. Empirically many observations have been made of disappearance of neuralgias through the giving of thyroid gland. I doubt very much if this is a specific endocrine reaction. It seems more attributable to the betterment of metabolism whereby detoxication is favored. Of this we have warrant in the experimental work which has shown how hypothyroida increases the effect of toxins, and how giving thyroid substance decreases it. A scientific study of the hormonic effect of endocrine substances is much to be desired, both in states where endotoxins seem to be responsible, and perhaps also in cases of chronic infection.

A clinical syndrome intermediate between radiculitis and peripheral neuritis is induced by the compression or irritation of the roots as they pass the intervertebral foramen in a state of arthritis. Although we are really dealing with a peripheral neurodocitis, yet the distribution of each nerve is that of the root which constitutes it, for not even the posterior primary division has yet left it. Hence, the differentia depending upon the distribution of separate bundles are not yet at our disposal.

Treatment of Radiculitis.—Necessarily a difference of treatment follows this difference of pathology. Radiculitis if syphilitic must be treated by arseno-benzol preparations and mercury as well as by correct hygiene.

Tubercular radiculitis requires enforced rest by an immobilizing apparatus, along with abundant nutrition, air and light, and sometimes surgical measures.

If a *neoplasm* is the cause, it must be removed surgically, or dealt with by the X-ray. One of the most obstinate affections of a root, although it is in reality already a peripheral nerve, is that consequent to *arthritis* of the spine; for in the first place the arthritis is a difficult matter to deal with, even when secondary to focal sepsis, and when this can be removed; for, in spite of this, the osteopathic results of the arthritis may be permanent and a compression neurodocitis persist. In the second place, this condition may go on for years without diagnosis, as it is too readily attributed to lumbago, rheumatism, or sciatica and treated empirically and futily.

A jacket relieves some of these cases markedly; but it seems to the writer that vertebral stretching in the early stages might prevent a distressing future incapacity.

In radicular sciatica all measures may fail and it may be necessary to stretch the root envelopes by the injection of normal saline through the caudal foramen.

Treatment of Neuritis.—Neuritis must be treated in accordance with its cause, i. e., the detection and elimination of mineral or other poison, when the nerves will regenerate spontaneously. Local sepsis must be sought for and eliminated. In neurodocitis, local application of heat, radiant energy, electrical ionization are sometimes highly beneficial. Massage is nearly always an advantage if properly given.

The *metabolic* condition I look upon as of supreme importance in many of these cases. Even the most obstinate sciaticas may yield in a week or two to carefully considered metabolic regulation. Where there is evident endocrine abnormality, internal secretions may have to be administered also.

The *mental disturbance* due to pain and lack of sleep must be dealt with also; but one cannot protest too strongly against the indiscriminate giving of anodynes and narcotics; for these disturb metabolism, and interfere with repair. In a long continued case, they produce addiction, which is a most troublesome tendency to get rid of. For restlessness and insomnia, the best measures are physiotherapeutic, especially hydrotherapy.

Conclusions.

Thus we have shown that these two conditions, which symptomatically seem to resemble one another so closely, when they are properly analyzed and differentiated, contrast in nearly every particular, in the nature of the sensory augmentations and losses, in the distribution

*See my paper, "Polyneuritis of Infectious Origin," Medical Record, Dec. 31, 1921.

TABLE OF DIFFERENTIA.

SYNDROME.	NEURITIS.	RADICULITIS.
Definition	Irritation of peripheral nerves	Irritation of spinal root.
Pathogen.		
Toxine	The usual cause	Doubtful.
1. Chemical poisons. Alcohol or metals, especially arsenic or lead	Frequent	Doubtful.
2. Bacterial poisons aside from local exudation, especially diphtheria and influenza	Occasional	Doubtful.
3. Diffuse metabolic poisons. Lithemia, Arthritism	Occasional	Doubtful.
4. Endocrine unbalance	Possible	Doubtful.
5. Focal infection	Occasional	Doubtful.
Tuberculosis	Scarcely	Frequent.
Syphilis	Rarely	Commonest cause.
Neoplasm	Occasional	To be suspected.
Physical agencies. Cold, trauma, etc.	Occasional	Especially trauma.
Concomitant of arthritis	Of the neighborhood	In the spine.
Pathology	Usually degenerative from toxicosis, by strangulation, by neurodocitis	Often inflammatory by strangulation, by inflammatory or neoplastic compression.
Onset.	Often abrupt	Insidious.
Symptoms.		
Pain	Except in plumbism or pure motor N.	Usual when posterior root is affected; lightning pains, Dejerine's sign, i. e., shooting pains on coughing, sneezing and straining.
Tenderness	Characteristic, especially of deep tissues	Absent or minimal.
Conductivity	Impaired	Impaired.
Hyperaesthesia	Except in early stages, irregularly progressive	Except in early stages, irregular, progressive.
Sensory dissociation	Pseudotabetic but never truly of tabetic type	Occasionally of Syringomyelitc type in tubercular R. Of tabetic type in syphilitic.
Motor Weakness	Usual	When anterior root affected best marked in tubercular R.
Atrophy	Severe except in mild cases; of long duration	Less evident except in tubercular R.
Deformity	Contracture and stretching of tendons and ligaments	Contracture and stretching of tendons and ligaments less marked.
Reflexes	Impaired except at first	Impaired.
Trophic Changes	Early and evident	Scarcely.
Extent	According to distribution of nerve affected. In polyneuritis more marked peripherally	In the segmental distribution of the roots affected.
Spinal Fluid	Normal	Increased pressure, albumen, white cells, etc.
Diagnosis	Increased deep tenderness with or without hyperaesthesia. Syndrome conforms to distribution of peripheral nerves	Hyperaesthesia both cutaneous and deep. Syndrome conforms to distribution of roots.
Differential Diagnosis	From trauma, osteitis, arthritis, myositis, meningitis, poliomyelitis encephalitis	From the same.
Prognosis	Highly favorable upon removal of cause	Unfavorable in proportion to destruction of sensory fibers. Favorable as regards motor fibers except when dense cicatrices have occurred.
Treatment	Elimination of the pathogen. Metabolic regulation. Physical agencies to stimulate local nutrition	Removal of the pathogen. Rest of the regions affected.

of muscular weakness and atrophy, in the trophic disturbances, and above all, in the pathology and in the treatment which is required. Hence, the importance of the differential diagnosis of these conditions cannot be too strongly emphasized.

1746 *K Street.*

PYELITIS.*

By R. S. FITZGERALD, M. D., Richmond, Va.

The kidneys are situated in the hypochondriac region on either side of the vertebral column, behind the peritoneum. The right kidney is a little lower than the left, probably because of the superimposed liver. The left kidney extends from the level of the interval between the eleventh and twelfth ribs, near the spine, to the level of the third lumbar spine. Each organ is inclined forward and inward so that their upper portions converge. The outer border faces upward and backward, the lower downward and forward. The kidneys are fixed in position by a series of short blood vessels, the parietal peritoneum, the pressure of the abdominal viscera, and a fibrolipomatous sheath called the renal fascia. This fascia is formed by a splitting of the subperitoneal connective tissue, enclosing the kidney in a pocket and passing inward as a single layer to cover the great blood vessels.

The kidney of average size is four and a half inches long, two and a half inches broad and one and a half inches thick. It weighs about four and half ounces.

The kidney usually is a brownish red color. It is fairly firm in consistence. The kidney is enclosed in a proper capsule of fibrous tissue, beneath which lies an investment of unstriped muscles. The solid part of the organ is composed of the cortical layer, containing the Malpighian glomeruli, which are the beginnings of the uriniferous tubules and the medullary layer, containing the straight and spiral portions of the uriniferous tubules as well as the collecting tubules. These collecting tubules are arranged in separate pyramidal masses, the pyramids of Malpighi, the apices of which form papillae projecting into the sinus. They are separated from each other by the cortical substance which envelopes them on all sides except in the region of the papillae. The papillae project into the calices or infundibula, which are the diverticula into which the ureter subdivides. When the ureter reaches the sinus, having passed in by the hilum, it dilates into a funnel-shaped sac called the pelvis. The blood supply of the kidneys is especially abundant. The lymphatics pass to the glands of the lumbar plexas lying near the hilum. The nerves are abundant and supplied with ganglia which come from the sympathetic system.

Pyelitis is an inflammatory or suppurative condition of the renal pelvis and its calices. Where there is associated with this an inflammation of the kidney substance itself, we have a pyelonephritis. This condition is usually due to an ascending infection from lower portions of the urinary tract. In all cases of suppuration of the kidney, especially in the ascending forms, there is constriction of the ureter or other obstruction of the flow of urine, due to calices, new growths, pressure upon the ureter, prostatic hypertrophy, etc. If this condition continues for any considerable length of time, there is stagnation of urine and pus in the renal pelvis and its calices, resulting in destructive changes of the renal parenchyma with its subsequent conversion in many cases into a pus filled sac. In almost all cases in which the renal pelvis is diseased, we meet with involvement of the ureter and its surrounding tissues, urethritis and periurethritis, leading frequently to subsequent constriction of the ureter and secondary pyonephrosis.

The pyelitis consecutive to inflammation of the kidney substance is of minor importance in the majority of cases, although, on the other hand, a renal inflammation which follows pyelitis is of very great significance, being associated almost always with far more serious symptoms and a much worse prognosis than the pyelitis itself.

Etiology: To get a proper conception of the various inflammations of the kidney and its pelvis, it is absolutely essential to understand the causes involved both as primary and accessory factors.

Practically all forms of inflammation of the kidney are due to bacteria, but in many cases, probably the majority, other etiological factors must be present before infection occurs. In certain cases we may have a pyelitis or pyelonephritis due to various poisons or drugs or to the toxins produced in various diseases. The

*Read by title at the fifty-second annual meeting of the Medical Society of Virginia, in Lynchburg, October 18-21, 1921.
Read before the Richmond Urological Society, December 10, 1921.

bacteria may reach the kidney or its pelvis by an ascending infection from the bladder and ureter, by descending infection from the blood stream, by way of the lymphatics, by contiguity from neighboring organs or tissues, or from other portions of the kidney itself, or directly, from without, by means of penetrating wounds.

Under normal conditions, the kidney and pelvis show marked resistance to infection, as bacteria of various kinds have been injected into the blood and into the bladder and no infection occurred unless some trauma or impediment to the flow of urine has been artificially produced. The normal urine itself possesses distinct bactericidal properties, this probably being due to acid phosphates present. When the resistance of the kidney or its pelvis has been lowered, infection may occur and we may have one or several of the forms of inflammation previously mentioned. The degree of infection in the individual case depends unquestionably to a certain extent upon the number, virulence and character of the invading bacteria and their mode of entrance.

Bacteriology of Pyelitis, Pyelonephritis and Suppurative Inflammations of the Kidney:—A great variety of bacteria have been found in these conditions, much the same flora, in fact, as those met with in cystitis, although the relative frequency of the different species is quite different. Among the organisms found may be mentioned staphylococcus pyogenes aureus and albus, streptococcus pyogens, diplococcus ureae liquefaciens, a urea-decomposing white staphylococcus pneumococcus, bacillus proteus vulgaris, typhoid and colon bacilli, gonococcus, and various bacteria and microorganisms. Typical pyelitis is that met with in ascending or urogenous infection, while that consecutive to renal inflammation is not likely to be so severe or to show such marked pathological changes.

In ascending pyelitis, the pelvis of the kidney shows a most variable picture, according to the type of infection, its duration, its virulence, and with what factors it is associated. The urine in mild acute cases may be slightly cloudy, the cloud consisting of pus cells, mucus a few epithelial cells, red blood cells and bacteria.

Acute catarrhal pyelitis gives the typical picture of an acute inflammation; the mucous membrane is congested, swollen and hyperemic, while on its surface may be seen red blood cells, pus cells, a few desquamative epithelial cells, mucus and bacteria in greater or less amounts, phosphates and oxalates, if the urine has been rendered alkaline.

Chronic Pyelitis. In this the picture is quite different. The mucous membrane is grayish or brownish red in color, discolored spots frequently mark the remains of the old hemorrhages, the mucous membrane is frequently pigmented and practically always markedly thickened, while the veins are large and tortuous. The covering of the mucous membrane is markedly dependent upon the nature of the infection and especially upon whether the urine is acid or alkaline. If the urine is acid in reaction, the coating is thin, while in alkaline urine this coating is thick and as a rule mucopurulent, with foul odor and with phosphate and oxalate crystals embedded in it. Ulceration is much more frequent in the acute form, though it may occur in the chronic variety.

The corresponding ureter is usually involved in cases of ascending pyelitis, although in rare instances it may be entirely normal, although the bladder below and the renal pelvis above are markedly diseased. It is often affected along its entire course, while especially important are the changes about the urethral openings into the bladder, the orifice may be dilated and surrounded by a markedly congested mucous membrane, or it may have a punched out appearance with induration and congestion of the surrounding tissues, very suggestive of an ascending infection. A diseased condition of the mouth of the ureter is one of the most important diagnostic signs of renal infection. The changes in the ureter are much more common in the ascending infection, although frequently met with in the descending type of the disease.

Symptoms: Acute pyelitis is usually characterized by a sudden onset of severe pain in the lumbar or lower abdominal region. There is often rigidity of the muscles, and tenderness of these parts. The patient often complains of nausea and may vomit and frequently has a chill. Frequent and painful urination is a valuable sign. The urine in the majority of cases contains large amounts of pus and some albumen.

Many cases of pyogenic infection of the kidney and of its pelvis are peculiarly devoid of characteristic symptoms, although careful examination, especially of the urine, should throw

light on a considerable portion. In every case of doubtful etiology, especially if associated with slight pain or sensitiveness in the back or either flank, with vague febrile symptoms, or with constitutional disturbances without definite cause, a careful urinalysis should be made, with the use of a cystoscope and the kidneys catheterized. In pyelitis associated with calculus and after various irritating drugs, the symptoms are more likely to be characteristic.

Pyelitis may last for years with practically no symptoms. In acute pyelitis we have the usual symptoms of acute inflammation, fever, chills, constitutional disturbances, while in the chronic form acute exacerbations are frequently met with, the symptoms usually resembling those of acute attacks, while in between the attacks the symptoms may have entirely disappeared or become very slight.

It is not at all uncommon for the acute cases and the exacerbations of the chronic cases to be regarded as appendicitis, while mild cases are frequently regarded as lumbago. Pyelitis and infection of a postcecal appendix or an appendix lying low in the pelvis and adherent over the ureter are always confusing.

I have had a case in which patient had many bladder symptoms, frequent and painful urinations and considerable number of blood and pus cells in the urine. Operation revealed appendiceal abscess. The most important factors in making a differential diagnosis between acute pyelitis and infections of the abdominal viscera are a carefully taken history, an examination of catheterized urine, and a cystoscopic examination, catheterizing both kidneys. The temperature in appendicitis is more constant as a rule than in pyelitis and chills are much less frequent. Acute infection of the gall-bladder frequently causes chills and an intermittent temperature resembling that of pyelitis.

Acute pyelitis frequently accompanies pregnancy and the puerperium and, if only a chemical test is made of the urine, toxemia of pregnancy may be suspected. In acute pyelitis, the patient usually complains of extreme weakness, chills, fever and often profuse sweats, complete loss of appetite and localized pain, sometimes also pain and increased frequency of urination, even when cystitis is not associated with it. There is sometimes diarrhoea, while nausea and vomiting are quite common. The pulse is usually rapid and full.

These symptoms usually last for a few days and then gradually merge into the chronic form. In the chronic form the patient may have increased thirst due to polyuria. Appetite is usually diminished, and dyspeptic disturbances frequent.

In the diagnosis of renal infections many questions suggest themselves. Are we dealing with a disease of the kidney or its pelvis; if so, of what nature? Are one or both kidneys affected? If operation is under consideration, is the remaining kidney able to properly perform the renal functions?

The most important element in the urine is pus but, in addition to this, the specific gravity, the reaction, and the amount of albumen should be determined and the sediment carefully examined for red blood cells, epithelial cells, mononuclear leukocytes, casts, bacteria, bits of renal tissue, fragments of stone, parasites, etc. Whenever we wish to determine whether the kidney is involved and, if so, to what extent, we should make use of the so-called functional test. Although this can not be definitely relied upon, it is a great help in the diagnosis. A cystoscopic examination should be made by all means to show whether you have cystitis or not, and also to carefully inspect the ureteral orifices, for by their appearance we may often determine which kidney is affected and noting whether the urine spurts from these orifices often helps in the diagnosis.

Prognosis: The cause and prognosis varies markedly in different cases, depending upon the character and virulence of the infection, the accessory etiological factors present, the drainage of the kidney, the presence or abscence of complications, and the general physical condition of the patient.

In acute pyelitis the course is usually rapid, the acute stage rarely lasting more than a few days; in very rare cases death may occur quickly, due to anemia with uremia, although, as a rule, the condition is either cured or becomes chronic. If proper treatment is inaugurated, cure is usual where the cause is transient or easily removed, as in the case of irritating drugs. The course of chronic pyelitis is very variable; it may be present for many years. The symptoms may be very slight with no appreciable impairment of general health, this being especially likely to occur in infections with the colon bacillus and

cases of chronic pyelitis of more than five years' duration.

TREATMENT. Some of these tubules form pus sacs. Catheterization of the kidney may give normal urine and even when the catheter has been in place for several hours the urine may be normal and then suddenly become loaded with pus, by one of these tubules exploding and filling the urine with pus.

The most important thing in the treatment of pyelitis is elimination, both by the intestinal and urinary route. The bowels should be kept moving freely and large amounts of fluid given. If sufficient water is taken, no drugs will be required to render the urine bland.

Urotropin has for a long time been the drug of choice. The action of urotropin depends upon the acidity of the urine, causing formaldehyde to be liberated and, as that remains in the bladder for at least two hours, it causes an antiseptic effect. The patient should be kept in bed at an equable temperature. It is especially important to avoid being chilled or getting feet wet. The diet should be simple. Milk or buttermilk is often best; all irritating drugs and highly seasoned food should be avoided. Ice bag may be used, although hot applications or hot water bags are more grateful to the patient. Sweats and warm baths often give wonderful relief. If the fever is high, phenacetine and quinine or some such remedy is indicated. If the pain is very severe, dry or wet caps or hot compresses give good results. In case of sleeplessness, bromides or veronal may be given. The administration of urinary antiseptics by mouth, such as urotropin salol, uva ursi, balsams, all have their places.

Treatment locally has a most satisfactory effect. Washing out the renal pelvis thoroughly with sterile water, followed by some silver salt solutions should be done by all means, and especially if there is any temperature as this lowers the temperature and relieves the pain.

The technique employed for washing out the kidneys is the passage of a soft ureteral catheter through a cystoscope up to the renal pelvis, and irrigating with boric acid solution until the fluid returns clear. Following this fill the pelvis with a 2% solution of silver nitrate and then let it drain out through the catheter, or you may use a solution of mercurochrome-220. This procedure should be repeated about every five days where you find much swelling and edema, and where the inflammation is very pronounced, the catheter should be left in the ureter and the kidney irrigated freely every 24 hours.

All cases in which the temperature and the pain continue should be drained and thoroughly irrigated with a 2% silver nitrate solution.

The surgical treatment includes the removal of any obstruction to the free escape of urine from the bladder, relief of the cystitis, the removal of renal calculi, and the evacuation of collections of pus in the kidney, nephrotomy and, under certain conditions, nephrectomy, or removal of the kidney itself.

In pyelitis of gonorrheal origin and in all acute cases which after a short time begin to show improvement, the ureter should be catheterized and the pelvis washed with a 3% boric acid solution or a 1 to 2% solution nitrate silver. The indications for surgical operation are intermittent pyuria, with fever during the intermissions, and septicemia even though the pus constantly escapes through the ureter. The operation depends upon the extent of destructive process in the kidney and whether one or both kidneys are affected.

If one kidney alone is infiltrated and full of abscesses, nephrotomy may be done and the pus evacuated. It often happens that the patient's condition improves and the remaining part of the kidney can be left in place to be of some use as an eliminative organ.

In many cases the kidney structure has been destroyed and removal is indicated several days after the pus has been evacuated. It is always better to let a few days elapse before the removal of the kidney after it has been drained, except in tubercular pyelitis, and in this condition it should be entirely removed at once. Where both kidneys are affected, nephrectomy is out of the question and, in feeble old men with a stricture or enlarged prostate, no operation can be done which holds much prospect of recovery. If the patient is in good general condition, evacuation of pus by incision may relieve the septic condition and, if the kidneys are not too badly diseased, they may function enough to maintain life a little longer.

I have under treatment now a man who was thrown from a railroad train in a wreck and landed face forward in a lot of slag by the side of the road. He was badly lacerated from chest to knees, penis being cut to pieces.

When it finally healed, the skin was grown tight down to the meatus and the meatus was too small to get a knitting needle in. He came to me about July 15, complaining of pains in the lumbar region. Upon examination I found the urine loaded with ropy pus and some blood. He was given urotropin, 7½ grs., with Fleet's phospho-soda three times daily. The blood disappeared in a few days and the pus became much thinner. Not being able to introduce a cystoscope on account of the small meatus, I insisted on doing a meatotomy which he refused at that time.

In addition to the above treatment, I gave him intravenously endomethylenamin one ampoule, every three days for twelve doses and noticed the urine cleared considerably. All pain has disappeared and now he has decided to let me cut this scar tissue and make a large meatus and I hope in this way to start a free drainage. The urine now is passed in a very small stream and by straining it takes him about ten minutes to empty his bladder.

400 *East Franklin Street.*

VESICAL DIVERTICULUM, WITH REPORT OF FOUR CASES.*

By S. BEVERLY CARY, M. D., Roanoke, Virginia.

Vesical diverticula are commonly classified as congenital and acquired. Of the two, the acquired is probably more common and occurs as the result of long-continued overdistention of a bladder which has some obstruction to its outlet, such as hypertrophied prostate and stricture.

We also see this condition in trabeculated bladders of tabetics. A diverticulum is such an important sign in this type of cord lesion that we immediately suspect its presence upon examination of a markedly trabeculated bladder which contains a large amount of residual urine, with no obstruction to its outlet. The congenital diverticulum exists from birth and is an anomaly of development due to an embryological defect. The size varies considerably; they may be small or the capacity a quart or more. The size is often increased when there is an obstruction to the bladder outlet; therefore, it is difficult to determine in a given case whether we are dealing with the congenital or acquired form. It has been the common custom to report all diverticula as congenital when there is no obstruction to the bladder outlet and the sac contains muscular walls, and as acquired when the muscular layer is absent and associated with definite obstruction. However, the clinical differentiation between the two types of diverticulum is most difficult and in the majority of cases cannot be accurately made. The authorities vary widely in their opinion as to the etiology; some writers believe that all diverticula are acquired, while others are inclined to feel that the great majority are congenital in origin. The occurrence of both types is much more frequent in the male than female; the reasons for this are obvious. An analysis of the four cases which have recently come under the writer's observation would lead us to logically conclude that both etiological factors may enter into their make-up. Two of these cases presented no evidence of vesical trabeculation or obstruction, while in the other two there was definite obstruction and trabeculation. The number varies in either type and as a rule they occupy the lateral walls of the bladder and are to the side of the ureteral orifice, and occasionally contain the mouth of the ureter.

The symptoms are often obscure and many of them never provoke trouble, their discovery only being made through a routine cystoscopic examination. Probably the most characteristic symptom of the uninfected pouch is where after a free evacuation of the bladder there occurs in a short period a subsequent call to urinate with a second and almost equal amount of urine being passed. When infection takes place, the symptoms are those of cystitis, and a positive and satisfactory diagnosis can only be made by a cystoscopic examination.

Treatment is required when the diverticulum produces symptoms due to stagnation and diverticulitis, when it presses on the ureter and affects the function of the kidney, or when it contains a stone or new growth. In those who are poor operative risks, and there are no complications such as a stone or a pus kidney produced by pressure of the diverticulum, the best line of treatment is to lavage the bladder at regular intervals, also catheterize and wash out the diverticulum. The latter is accomplished with the ordinary catheterizing or operating cystoscope by means of a large ureteral catheter being passed into the pouch. After the mucus and pus are cleared out so far as possible, argyrol or mercurochrome is instilled and allowed to remain. In many cases

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of diverticulitis this treatment proves to be curative. Every case should be given palliative treatment for a reasonable period, as it not only often offers complete relief of symptoms, but is a most excellent preparatory treatment for an operation. In selected cases of diverticulitis with strongly alkaline urine, bulgarian bacilli emulsion has been used with success. One case in my series did well on this treatment. Before resorting to surgery it is important to know the general state of health of the individual, also to know the condition of the bladder and kidneys, as well as to determine if possible the presence of a new growth or whether it is a case of simple diverticulitis.

The various methods of operative treatment are:

1. Removal of complications.
2. Enlarging the orifice of the diverticulum for the purpose of securing better drainage.
3. Plastic surgery.
4. Excision of the mucous lining of the sac with suture of the walls of the orifice.
5. Extirpation and transplanting the ureter, should it open directly into the sac.

Case 1. W. G. S. Male, aged 59, machinist. Presented himself for examination May 24, 1917, complaining of frequency of urination. Stone was removed from bladder five years ago. At present there is a constant desire to urinate, act accompanied by tenesmus and burning. Voids from eight to ten times a night. Considerable amount of blood is passed and urine has a very offensive odor.

Urological examinations May 25, 1917. Very slight enlargement of the prostate, two ounces of residual urine. Bladder capacity thirteen and a half ounces. Urine strongly alkaline and contained a quantity of pus and mucus. Pure culture of staphylococci.

Cystoscope introduced without difficulty, the bladder was found to be moderately trabeculated and intensely inflamed with flakes of pus clinging to its walls. Several dark areas were detected which appeared to be openings of diverticula. May 26, 1917, bladder was distended with iodide of silver and radiographed. Picture showed two pouches about the size of a guinea egg coming off from the lateral walls. The smaller pouches did not show up on the plates.

Diagnosis: Moderate enlargement of the prostate; diverticulitis and cystitis. Staphylococcic infection.

Treatment: Irrigations of boric acid and silver nitrate for a period of about two weeks, with no result. Then the following treatment was carried out: saline irrigations to clear the bladder of mucus and pus, followed by injecting an emulsion of bulgarian bacilli. This procedure was carried out every day for ten days, and every other day for two weeks. Patient reported great relief and was fairly comfortable until his return June 9, 1919. The bulgarian treatment has been carried out at intervals since. Recently he reported that he is getting along comfortably. The benefit derived from the bulgarian bacilli is undoubtedly due to establishing an acid culture ,which counteracts the irritating alkaline decomposition. The principle is the same as that brought out by Caulk in the treatment of encrusted cystitis.

Case 2. E. L. L. Male, aged 63, banker. Presented himself for examination April 6, 1919, complaining of frequency of urination and hematuria. First noticed blood in urine two months ago, which lasted about one week. Several weeks previous to this there was a slight frequency in desire to urinate; however, he was disturbed only once or twice during the night. For the past two weeks the hematuria has been constant and frequency of urination more pronounced. Previous treatment consisted of weak silver nitrate irrigations and internal medication.

Urological examination: Prostate and urethra negative. Three ounces of residual urine. Bladder capacity eleven ounces. Urine contained a large quantity of blood and numerous pus cells and bacteria of various kinds.

Cystoscopic examination revealed a highly congested bladder, especially marked of the trigone, prostate and vesical neck. A dark area about the size of a dime was detected about one-half an inch above and to the left of the ureteral opening, this picture being typical of a diverticular opening. A ureteral catheter was passed into it for a distance of two inches before meeting with resistance. Both ureters were catheterized; the left was somewhat difficult to enter on account of the distorted angle of the trigone. Kidney specimens negative except for an occasional leukocyte.

X-ray examinations negative. Wassermann negative.

XUM

DIAGNOSIS: Cystitis and diverticulitis. Mixed infection.

TREATMENT consisted of bladder irrigations and flushing the pouch with boric acid solution followed by 10 per cent. argyrol. This treatment was carried out at intervals with good results in regard to the infection, but the intermittent hematuria continued. Cystoscopic examination several months later revealed a smooth rounded mass, which appeared to be a new growth, presenting itself at the diverticulum opening. A suprapubic cystotomy was carried out and a smooth diverticulum opening, which would easily admit the index finger, was found. The interior of the sac contained an extensive tumor mass with indurated base, which practically filled the 100 cc. capacity sac. The sac proper extended upward and to the right for some distance beyond the median line, the posterior bladder wall practically acting as a septum. A radical operation was not carried out for obvious reasons. The pathological examination of a section removed showed a rather active carcinoma.

CASE 3. A. G. D. Male, aged 71, merchant. Presented himself for examination January 23, 1920, complaining of frequency and straining on urination which, he stated, first gave him trouble two years ago, but has been gradually growing worse for the past eight months. At present he has to get up eight or ten times a night. The stream is difficult to start and has no force. Urine cloudy, all three glasses. No enlargment of the prostate per rectum. No. 18 F. sound was passed with difficulty on account of an obstruction at the peno-scrotal junction and in the posterior urethra. Sounds were passed at intervals until the urethra dilated to No. 26 F.

Cystoscopic examination revealed a slight vesical enlargement of the prostate and an intensely inflamed bladder, which was moderately trabeculated, and a diverticulum opening was located about one-half an inch to the right and one-fourth of an inch above the left ureteral meatus. A small opening was located in the same position on the right. A ureteral catheter was passed into the left opening and coiled several times. X-ray pictures were made with catheter in place before and after injection with sodium bromide solution.

DIAGNOSIS: Moderate vesical enlargement of the prostate; stricture of the anterior urethra; cystitis and diverticulitis. Colon bacilli infection.

TREAMENT in this case consisted of appropriate attention to the stricture, and vesical diverticulum lavages, which gave temporary relief. Had it not been for the general condition of the patient a radical operation would have been carried out.

CASE 4. E. C. F. Male, aged 63, machinist. Presented himself for examination November 19, 1920, complaining of pain and frequent urination which first gave him trouble three weeks ago. Voids four or five times at night and about every half an hour during the day, act accompanied by intense burning and tenesmus. No blood or gravel. Examination revealed a slight discharge from the urethral meatus which proved to be free from gonococci. Cloudy urine, all three glasses. Prostate per rectum normal. X-ray examination negative.

No. 24 F. cystoscope was introduced without difficulty. The bladder mucosa was found to be intensely inflamed and a diverticulum opening about the size of a three-cent piece was located immediately posterior to the base of the trigone and about the median line of the bladder. About one-half an inch from this another small opening was detected. A ureteral catheter was introduced into the large opening and coiled several times. X-ray plates were made before and after injection with sodium bromide solution. The first showed the catheter coiled in the shape of a ring, the size of a half dollar. Second plate, which was taken after the introduction of 20 cc. of sodium bromide solution, showed a shadow about the size of an English walnut.

DIAGNOSIS: Cystitis and diverticulitis. Colon bacilli infection.

TREATMENT consisted of vesical and diverticulum lavages for a period of one month. The symptoms promptly subsided and the urine has remainted free from pus and bacteria.

CONCLUSIONS: *First*, diverticula may be congenital or acquired in origin. *Second*, their occurrence is not so rare as generally believed. *Third*, In the absence of complications, simple diverticulitis should be treated by the expectant plan for a reasonable period, as many of these cases wil entirely clear up. Even though we do not get the desired results the patient is certainly in a better condition for any operative procedure selected.

MacBain Building.

HEPATIC FUNCTION*

By WARREN T. VAUGHAN, M. D., Richmond, Va.

The liver, the largest organ in the human body, possesses a large number and a considerable variety of functions. No other organ probably plays so important a role in the metabolism of such diverse substances as does the liver. Liver cells remove substances from the circulating blood, and, after transforming them chemically and biologically, they either return the changed substances immediately to the blood, or excrete them with the bile, or store them for a longer or shorter period of time.

These cells secrete bile, form and hydrolyze glycogen, store fat, form urea from ammonia, serve as a temporary storehouse for iron, produce fibrinogen, and detoxicate what poisonous substances customarily find their way from the intestines into the portal circulation. These functions we already know of. Presumably there are more. Dissociated jaundice in which bile pigment is shunted into the blood while the bile salts pass, as normally, into the intestines is an excellent example of the very delicate functional adjustment of the liver cells.

Cirrhosis of the liver is a chronically progressive condition which is usually accompanied by recognizable changes in the size of the organ. This condition is less frequently seen than is chronic nephritis and produces as a rule less dramatic results. Studies of hepatic function have seemed, therefore, to be of less importance than studies of kidney function. On the contrary it is probable that the liver cells become deranged in one way or another more frequently than is the case with the renal epithelium. There is some evidence suggesting a greater tendency on the part of the hepatic parenchyma to return to normal. Apparently also the cells may function perfectly in certain of their tasks while being unable to successfully carry out others. It is not certain that this indicates impairment of certain groups of cells as is the case in certain other organs, for we have been unable to discover as many clearly differentiated types of hepatic cells as there are types of hepatic function.

It is probably true that occasionally a liver which has apparently been functioning normally will, when called upon for some unusual or extreme task, fail in the performance of its work. The surgeon, probably more frequently than the internist, meets with functional failure of the hepatic cells. There is a tendency to smile at the surgeon as we have sometimes smiled at the family physician who speaks of "sluggish liver" and ascribes many of the patient's complaints to hepatic insufficiency. It is more than probable that during an operation under general anesthesia the liver in particular is called upon to do an unusual amount of work. The rapid and usually progressive collapse which occasionally follows extensive operations is often due, in the opinion of the surgeon, to inability of the liver to properly functionate. The symptoms are not entirely those of shock and although they appear more frequently in individuals in whom the operation is on some portion of the biliary tract, yet they do occasionally follow operations upon other organs. Frequently, especially in terminal cases, a slight icterus appears in the conjunctivae.

Crile emphasizes the fact that the important problems in present day abdominal surgery are to be found in the so-called "bad-risk" cases, individuals in whom the margin of safety has been reduced by starvation or infection, by the toxins of cancer, by auto-intoxication, etc. He has emphasized the importance of exhaustion in predisposing to bad risks, and finds that in all types of experimental exhaustion the cells of the liver show pathologic changes, such as diminished power of differtial staining, edema, and increased electrical conductivity. He considers a very close relationship to exist between the activity of the liver cells and those of the brain and the adrenal gland. He believes that whatever tends to stimulate body metabolism should be avoided, if possible, preliminary to operation, particularly in order to lessen the burden on the liver. Thus, excitement and worry are to be avoided. He also believes that whatever interferes with the internal respiration of the liver should be removed if possible. Thus, cases suffering from asthma, edema, pleurisy, tuberculosis, heart disease, etc., are relatively poorer operative risks. The administration of a general anesthetic produces, according to Crile, an increased hydrogen ion concentration in the blood and interferes with the internal respiration. He believes that all of these factors are correlated with the ability or inability of the liver to properly perform its function.

Most evidence so far advanced regarding hepatic insufficiency following operation has

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been entirely theoretical and not at all conclusive. If such a condition does exist, it is highly important that we evolve some means of studying the function of the liver.

Mann has studied loss of liver function in dogs, produced by complete removal of the organ. Quite uniform symptoms follow such an operation. The immediate recovery did not differ in symptomatology or in duration from that following other operations; after four to eight hours, however, the animal rapidly sickened, and died. Before the appearance of these final symptoms the condition was apparently similar to that of any other animal following any other operation involving a like period of time and an equal amount of trauma. The onset of the final period was sudden and first evidenced by muscular weakness. Progressive muscular relaxation was followed by localized twitchings, and finally general convulsions and death. No fever accompanied these changes. Blood creatinin and urea determinations made both before the operation and during coma gave normal values. The blood sugar, on the other hand, decreased to less than half its normal value. Mann notes the similarity between symptoms following removal of the liver and those following total loss of function of the adrenal glands.

Fortunately, we are rarely if ever called upon to treat clinical conditions caused by total suppression of hepatic function. It is in further study of derangement of specialized functions of the organ that we may hope for improvement in our present knowledge and methods.

A rather extensive investigation has been carried out regarding the relationship between hepatic function and sugar tolerance. One of the late reports on the subject is by Jacobson. He found that after an Eck fistula operation, experimental animals developed an extremely low tolerance for laevulose. Glucose tolerance is but slightly modified after such an operation. The production of alimentary laevulosuria is regarded as evidence of hepatic insufficiency.

Galactose has similarly been used as a test of liver function. Alimentary galactosuria has been looked for following the ingestion of forty grams of chemically pure galactose. Sisson believes that patients with icterus catarrhalis have an intolerance to galactose.

Attempts to quantitate hepatic function by means of the ingestion of certain dyes similarly to the dye tests for renal function have so far been unsatisfactory. The results, however, are suggestive. The phenoltetrachlorphthalein test has been rather extensively used. There are some disadvantages such as the difficulty of collecting entire specimens of feces, the discomfort caused the patient by catharsis, and the wideness of range in per cent. of excretion in individuals with apparently normal livers. According to Goodpasture, the phenoltetrachlorphthalein test is fairly accurate in acute liver injuries but is entirely unreliable in chronic disease such as cirrhosis of the liver.

The liver is a normal and important site of fibrinogen formation. It has been shown that in severe acute injuries to this organ the fibrinogen content of the blood is reduced. During recovery from experimental liver injury the blood fibrinogen content is increased above normal.

Goodpasture described, several years ago, a qualitative test which appears to be thoroughly reliable in cirrhosis of the liver but which for some reason is not widely known and has not come into general use. He reported four cases of atrophic hepatic cirrhosis in each of which sterile specimens of venous blood clotted within a normal length of time, but in which the clot redissolved completely within a few hours at body temperature. He designated this phenomenon fibrinolysis. The clotted blood from normal individuals will usually stay for several days at body temperature without redissolving. The fibrinolysis test for cirrhosis of the liver, particularly for atrophic cirrhosis, appears to be quite constantly positive. We have found it to be so in all such cases in which we have had occasion to perform the test.

Rowntree, Marshall and Chesney have summarized the recent knowledge regarding liver function in part as follows: Under clinical conditions a phenoltetrachlorpthalein output of less than thirty per cent. with the appearance of the dye in the urine is of unquestionable significance. Low fibrinogen values are frequently but inconstantly encountered in cirrhosis. The determination of the lipolytic activity of the blood plasma is of little significance. Goodpasture's fibrinolysis test when positive seems to be of undoubted diagnostic importance, indicating cirrhosis of the liver. While theoretically the sugar tests, particularly the laevulose and galactose tests, should give reliable information in functional derangement of the liver, practical experience

shows that the results are not trustworthy. It is probable that in the metabolism of any kind of sugar too many other organs besides the liver play a part.

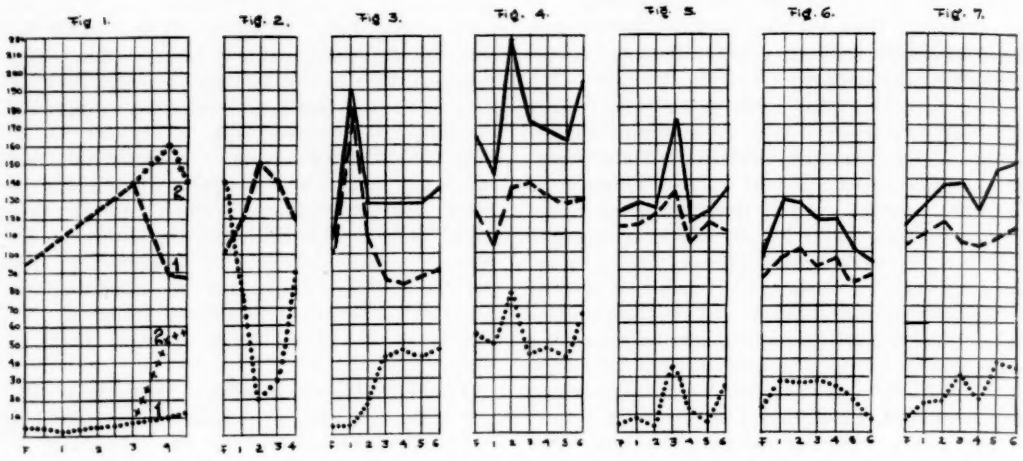
The fact that the liver is the chief urea forming organ of the body suggests that a study of the nitrogen partition of the blood might give information of value. There is no constant change in the percentage of blood urea nitrogen, but the amino-acid nitrogen has been comparatively high in a large proportion of clinical cases. The partition of the urinary nitrogen sometimes gives suggestive information. The ammonia nitrogen and the amino-acid nitrogen was definitely increased in most of the cases studied by Rowntree and his associates, particularly in cirrhosis.

Any practicable test for liver function must involve a minimum of discomfort to the patient and a minimum of time in its determination. Kahn has more nearly approximated this requirement in a recent preliminary report in which he described the determination of phenoltetrachlorphthalein elimination by the liver by means of collecting the excreted dye through the duodenal tube. The appearance time in this method of examination may prove to have considerable value. But even here the necessity for passing the duodenal tube will in some cases constitute a draw-back.

Quite recently Cammidge, Forsyth and Howard have made a further contribution to the study of hepatic function. A certain quantity of sugar is normally present in circulating blood. Its amount is determined after removing the blood proteins. If this protein free filtrate is hydrolyzed with heat and hydrochloric acid—a procedure which would convert starches, dextrins and the higher polysaccharides into glucose—there results little or no increase in the amount of sugar. Therefore, in normal blood there is little or no higher sugar compound capable of producing glucose on hydrolysis (Charts 1, 4 and 6). In diseases of the liver or pancreas, however, such substances do apparently exist in the blood. The determination of blood sugar after hydrolysis gives considerably higher value than without hydrolysis. More sugar has been formed. Cammidge and his co-workers choose to call the difference between the ordinary sugar value and the higher value after hydrolysis, the "difference value" of the blood. Observations on normal blood have shown that the difference value is very small and is not appreciably influenced by food or by the nature of the diet. In cases of pancreatic disease the difference value is high. This is particularly true in the fasting patient. If a patient with pancreatic disease is absorbing food, the blood sugar rises. The "difference value", however, falls. In other words, the abnormal substance tends to disappear during the digestion and absorption of food. As the blood sugar falls to normal, after digestion, the difference value again rises. (Chart 2.) This inverse relationship appears to be characteristic of disturbances of pancreatic function. The nature of the food seems to exert little influence.

The investigators believe that in pancreatic disease there is present in the blood an abnormal substance which on hydrolysis becomes changed into sugar. This substance appears to be derived chiefly from the glycogen stores of the liver and is an intermediate product, probably a dextrin, formed in the conversion of glycogen to sugar. The liver contains a starch-splitting ferment by whose activity the glycogen is broken down. The pancreas, probably through its internal secretion, exerts a restraining influence on this ferment. Deficiency in the secretion from the pancreas gives greater liberty of action on the part of the glycolytic ferment, and results in the formation of the intermediate product. Stimulation of the pancreas by digestion causes that organ to pour forth the hormone in greater abundance so that the inhibitory action on the liver ferment temporarily approaches more nearly normal. The difference value falls. With lessening of pancreatic activity, after digestion, the difference value again rises to its abnormal level.

According to this theory both liver and pancreas play a part in the determination of the difference value. In hepatic derangements, the difference value curve differs from that described in disease of the pancreas. During fasting, it is abnormally high in pancreatic disease, while in hepatic insufficiency it is within normal limits at this time. Here again the blood sugar rises after a meal, and after about three hours gradually falls to the normal level. The difference value rises likewise, but continues to increase for several hours independent of the later fall in sugar concentrations, until a level which may be ten or twelve times the highest normal limit is reached. Sometimes the rise is rapid and reaches its



Broken lines indicate the blood sugar values obtained. Full lines indicate the blood sugar value after hydrolysis. Dotted lines indicate the "difference value", as described in text. In figures 1 and 2 the hydrolysis value is not indicated, but the difference value, which is obtained as the difference between the original blood sugar and the hydrolysis blood sugar value, is indicated.

Fig. 1. Normal curves, first, after test breakfast, and second, after a test breakfast and the additional administration of glucose two hours later.
Fig. 2. Pancreatic type of difference value curve.
Fig. 3. Pick's disease, with hepatic cirrhosis.
Fig. 4. Normal liver.
Fig. 5. Carcinoma of liver.
Fig. 6. Chronic passive congestion of liver.
Fig. 7. Carcinoma of head of pancreas, with obstruction of common bile duct.

maximum within four hours after a meal, while at other times it requires as long as seven or eight hours. There is no constant relationship to the blood sugar, such as was found in pancreatic disease. Urine curves show similar changes.

In disease of the liver, there is little or no abnormal dextrin in the blood of a fasting individual, but, after a meal, it appears and continues to increase in amount for several hours. Later, it gradually disappears. In pancreatic disease the substances disappear during digestion while in liver disease this is when they do appear. The return to the initial level is more rapid in the former condition and occurs synchronously with the return of sugar values to normal. In liver disease the return to the original level is prolonged and does not synchronize with the sugar curve.

Cammidge and his co-workers suggest that the hepatic type of curve is due to the passage through the liver and into the systemic blood of dextrins derived from absorbed food, which the damaged liver has been unable to completely remove from the portal circulation. However, in experimental animals in which the liver has been damaged by hydrazine, there is sometimes an increase in difference value in the blood not accompanied by a similar increase in the urine. In this particular instance the dextrin circulating in the blood appears to be non-dialyzable, and thereby differs from that appearing after the ingestion of food. Probably this phenomenon is due to diminution or absence of the amylolytic ferment supposed to be normally present in the liver. Glycogen liberated during the breakdown of liver tissue is not further broken down because the starch splitting ferment is insufficient or absent. Thus dextrin-like bodies derived from the glycogen of the liver may be a contributing factor in the production of the raised difference value under certain circumstances.

We assume from Cammidge's report that the non-dialyzable dextrin is usually only observed in cases where there is acute extensive injury to the liver parenchyma. It depends for its existence on rapid extensive damage to the liver cells.

The work of Cammidge and his associates is worthy of careful study. In it is suggested a new method of observation of hepatic and pancreatic function. There are certain obvious disadvantages and likewise some very distinct advantages to the method. If found to be practicable it will be of advantage that the

work can be done on the blood or urine alone and that unsatisfactory feces collections, etc., are eliminated. If the curves are found to be characteristic, they should have as much value as the colloidal gold curves in the diagnosis of various cerebrospinal affections. The chief disadvantage, and one which may later be eliminated, is the fact that the substances causing the reaction are as yet hypothetical, and that the explanation of the different types of curves obtained depends for its accuracy upon the correctness of the author's hypothesis.

We have had occasion to employ the difference value test in a number of instances, and, so far as our work has taken us, we are able to corroborate the preceding findings. Chart 3 is from a patient suffering with Pick's disease with its concomitant hepatic cirrhosis and ascites. The curve is typically hepatic in type.

Chart 4 is for an individual suffering from hemorrhoids and whose liver is normal so far as can be ascertained from the subjective symptoms and general examination. It will be noted that the difference value curve in this case is not a flat line as in Chart 1. Chart 1 is from Cammidge's report. In it the No. 1 lines indicate dextrose and difference value curves after a test breakfast. If, two hours after the test meal, glucose be administered in addition, the subsequent curves will follow the No. 2 lines, and the difference value will rise, similarly to Chart 4. Thus, the food eaten modifies the type of curve, even in the normal.

Cammidge has not designated the articles used in his test breakfast and we have, therefore, evolved a meal of our own, consisting of two tablespoonfuls of well cooked oatmeal gruel, two slices of toast, coffee, sugar and cream. This diet was selected on account of its high dextrin content. We are now investigating the difference between Cammidge's normal curves and our own, and in the meantime, are assuming that the cause is due to difference in the test meals. Ours is a distinctive type of curve, the difference value following the glucose curve, instead of being in inverse relationship as in the pancreatic type, or unrelated as in the hepatic type.

Chart 5 again conforms to our normal curve. It represents a patient with general carcinomatosis with involvement of the liver. Presumably those liver cells not invaded are functioning normally. There was no jaundice.

Chart 6 is for a cardiac case with decompensation, congestion of the liver and ascites. The interpretation of the lengthening of this otherwise normal curve is in retarded absorption through the edematous intestinal mucosa.

In Chart 7 the curve appears to follow the normal at first, but during the last two periods the hydrolysis value again increases. In fact, even by the second hour one sees a distinct upward trend conforming more to Chart 3 than to Chart 4 or 5. This patient was suffering from carcinoma of the head of the pancreas with obstruction of the common bile duct and intense jaundice, but without metastasis to the liver. Knowledge concerning the difference value is still too limited to enable us to explain these two latter curves, but their general character gives one the impression of a liver which is performing its function fairly satisfactorily at first, but which towards the end finds the task too difficult.

If this be the true explanation, this latter type of curve will be characteristic of the earlier or milder stages of hepatic dysfunction and will eventually become one of the most important types to the clinician.

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St. Elizabeth's Hospital.

THE ADVANTAGES AND LIMITATIONS OF SKIN TESTS FOR PROTEIN SENSITIZATION IN BRONCHIAL ASTHMA, HAY FEVER AND ALLIED CONDITIONS.*

By J. MORRISON HUTCHESON, M. D., Richmond, Virginia.
Professor of Therapeutics in the Medical College of Virginia.

During the past decade the question of protein sensitization in the production of disease has been widely studied from both the laboratory and clinical standpoint, and from these extensive investigations there have been derived

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certain important facts which constitute a valuable part of the progress of that period. It is now generally recognized that hypersusceptibility to various protein substances forms the basis of a number of symptom complexes formerly classed as separate diseases of obscure etiology, and that by means of fairly accurate tests the offending protein may often be determined, thereby revealing a means of specific and effective treatment. The literature accumulated thus far has dealt chiefly with bronchial asthma and hay fever, but it is evident that urticaria, eczema and angio-neurotic edema may occur from the same cause and there seems reason to believe that various gastro-intestinal disturbances, as well as certain cases of migraine, epilepsy and paroxysmal hemoglobinuria may have the same etiological basis.

Since Meltzer[1] first suggested the anaphylactic explanation of bronchial asthma, this and several other clinical phenomena have been broadly grouped as manifestations of anaphylaxis and have been studied chiefly from this standpoint. While it is impossible to prove or disprove the assumption that the manifestations of artificial sensitization in animals and the symptoms arising from natural hypersusceptibility in man are due to identically the same process, the points of similarity are striking, and the analogy has served as a valuable guide in the study of the more obscure condition.

That hypersusceptibility in man may be responsible for certain symptoms seems to be proven clinically. Seasonal hay fever due to the pollen of some plant gives a striking example. Outside of the pollen season the patient is entirely free from symptoms, yet sneezing can be produced at any season by inhalation of the pollen or by injecting it into the circulation. Horse asthma furnishes another common illustration of the same process by which definite manifestations promptly follow the contact of a susceptible individual with the substance to which he is sensitive, and numerous other well-known instances might be cited. Of greater significance, however, is the fact that the vast majority of patients with seasonal hay fever and asthma due to the emanations from horses show not only the symptoms referable to the respiratory tract, but, when small quantities of the substances to which they are sensitive are brought in contact with their mucous membranes, or rubbed or injected into their skins, a characteristic reaction is produced consisting of a local erythema or urticarial wheal. Furthermore, when naturally sensitive individuals are injected repeatedly with small quantities of the protein to which they are sensitive, their symptoms are often relieved. The basis, therefore, of our preent knowledge of hypersusceptibility as a cause of disease consists of these three facts: the occurrence of symptoms after contact with certain substances, either by inhalation, ingestion or direct introduction into the circulation; the skin reactions produced by the same substances when locally applied; and the relief of symptoms by carefully avoiding the causative agent or by injecting it in small quantities until a tolerance is acquired.

In the study of a case in which idiosyncrasy or hypersusceptibility is suspected, the determination of the substance to which the individual is sensitive is of prime interest. Valuable suggestions may be derived from the family and personal history in practically all cases and these, together with a careful examination of the patient, should never be omitted. In the majority of instances, however, skin tests are essential, and the reactions obtained and properly interpreted furnish the most reliable information available for directing successful treatment.

In selecting proteins for testing, one cannot be guided by theoretical considerations alone. It is known that the protein element in various substances is responsible for sensitization, and these when isolated are often closely related or identical chemically. The protein molecule is composed of smaller molecules which are separated by the action of either mineral acids, alkalies or enzymes, and the possible combinations of the amino-acids thus liberated are alomst incalculable[2]. Specificity, therefore, cannot be explained purely on chemical grounds, but of necessity it must be concluded that the reactions obtained are group reactions and not caused by distinct chemical compounds[3]. Clinical experience, however, has indicated what groups of proteins commonly cause sensitization, and until more is known of the exact nature of the process, this experience must serve as a guide both for applying tests and for their interpretation.

From the now voluminous literature

which includes a summary of the results of skin tests obtained by various workers, one gets a variety of impresssions, dependng upon the particular aspect of the subject dealt with by the individual author. It is agreed generally that the tests are of great value and the percentages of positives in the same class of patients is surprisingly uniform. The actual figures given, howevr, are significant only in so far as they indicate the general usefulness of the tests.

In attempting an analysis of my own cases, I was particularly impressed with the difficulty of any satisfactory clinical classification. Bronchial asthma and hay fever were naturally the prominent manifestations in the majority of patients inasmuch as these conditions have been the first to suggest sensitization. However, where other symptoms are kept in mind and routine inquiry is made regarding them, it is surprising how frequently combinations of two or more are found to exist in the same person, particularly of asthma, hay fever, urticaria, angio-neurotic edema or eczema. It would seem, therefore, that these syndromes, instead of being looked upon as clincal entities, might be regarded as symptoms or expresssions of an underlying sensitization to foreign protein.

From a review of the records of 100 patients on whom I have made skin tests, the deductions as to the frequency with which positive reactions occur are approximately those published by Walker,[4] Rackemann[5], Cooke,[6] Gottleib[7] and others for asthma and hay fever. There were 70 cases showing typical bronchial asthma, but 22 of these gave evidence in addition of one or more of the other conditions. Of these 70 cases, 33 or 47% showed positive skin tests to one or more proteins. Seasonal hay fever was the predominating complaint in 18 cases, and 16 of these gave positive skin tests, but 9 showed also one or more of the other syndromes. The remainder of the cases consisted of urticaria, angio-neurotic edema, eczema, perennial hay fever, or combinations of these. Ten cases in which urticaria was the chief complaint showed positive tests in 5, while of 4 cases of perennial hay fever 2 gave positive reactions to proteins.

All of these patients were thoroughly studied. Histories included data on possible hereditary idiosyncrasy, habits, environment and diet, with description of attacks, particularly as to time, season, duration and method of relief. Complete physical examinations, with routine blood smear, Wassermann and urinalysis, were made and special examinations of the nose, throat and sinuses done in all cases involving the respiratory tract. The information gained from these investigations was often valuable for selecting tests, but rarely if ever could a satisfactory conclusion be arrived at without skin tests. A family predisposition is suggestive of hypersusceptibility, but of no practical value in diagnosis, as members of the same family show different manifestations of sensitization. Statements as to time of attacks, season, frequency, duration etc., are of great value as they not infrequently indicate that the cause belongs to a certain group of proteins. Local infections have received much attention, particularly in asthma, and should be thoroughly treated. However, I recall several instances in which patients with obvious sinus or tonsillar disease proved sensitive to outside proteins and were relieved by avoiding contact with them. In two of my cases of asthma in this series the Wassermann test was positve, but I have no reason to believe that this in any way influenced the symptoms.

The results of treatment in the sensitive cases were variable. As a rule, where the protein was definitely determined and the patient capable of intelligent and thorough co-operation, the results have been good. As an example the following case is cited: A child of seven had suffered since her second year from hard attacks of asthma occurring at any time of day or night, often requiring a hypodermic of morphine for relief. Attacks sometimes numbered 4 or 5 a day, and the longest period of freedom had been five weeks. The tonsils had been removed with apparently no effect on asthma. Examination was negative except for polypoid degeneration of middle turbinates. Skin tests for wheat oats and rye were positive. Cereals were carefully excluded from the diet and within a few days the attacks ceased. Instructions have been carefully followed by an intelligent and interested mother for more than a year, and the patient has remained practically free from symptoms. When she was examined last, however, the skin tests for cereals were still positive, though not to the same degree as previously.

In a number of instances skin tests revealed multiple sensitization and it was difficult to

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determine which protein was giving trouble. This question was finally decided upon the degree of sensitivity revealed by the individual tests and by the patient's possibilities as indicated by his history and environment. Multiple sensitization is frequently encountered, and adds to the difficulty of diagnosis, but the fact of its presence by no means precludes successful treatment.[8]

As has often been observed by others, my cases showed that the earlier in life the symptoms begin the more apt is the patient to prove sensitive to some known protein. Coke[9] states that it is possible by skin tests to classify 50% of asthmatics and 90% of asthmatic children.

In the process of investigating the symptoms commonly associated with hypersusceptibility, one is frequently impressed with the possibility of a still wider application of the study. For instance, a patient in this series who had suffered off and on for years from attacks of mucous colitis suddenly developed asthma. Skin tests showed a positive reaction to milk, and subsequent experience indicated that the mucous colitis and asthma were due to the same cause.

As a routine, I have used the cutaneous method of testing as advised by Walker and have found it satisfactory. Where reactions were doubtful to any special protein, the test was repeated and, if possible, checked by the intradermal method which consists of injecting solutions of the protein of varying strength between the layers of the skin. This method is extremely delicate for routine use and is considered by Walker[10] to be impracticable and erratic. By Cooke[11] it is held to be much more reliable than the cutaneous method.

Having obtained a positive cutaneous reaction to one or more proteins, its significance in the case under study must be carefully weighed. An individual may be sensitive to a number of substances and have symptoms from only one, while one positive test does not always explain the clinical disease. It must be remembered also that normal human beings show a small proportion of positive tests.[12]

It is a somewhat disconcerting fact that after all our elaborate investigations have been carried out there still remains about one-half of our cases, clinically indistinguishable from the positive half, the cause of whose sensitization we are unable to ascertain. At present we lean to the assumption that these individuals are sensitive to some substance of bacterial origin manufactured within their bodies. Of this we have little or no proof except the good results occasionally observed after the removal of infectious foci and the relief that often follows the use of vaccines. Skin tests with bacteria are not nearly so satisfactory as with other kinds of proteins for the reason that the percentages of positives to common stock organisms is extremely small. Sanford[13], in 365 tests with the staphylococcus pyogenes aureus and albus, obtained no positive reactions. Caulfield[14] states that on account of the scarcity of positive reactions he has practically abandoned testing with bacteria as a routine. It would seem, therefore, that the role played by bacteria in sensitization is by no means clearly understood, and is a matter for research rather than for dogmatic statement.

SUMMARY: Sensitization or hypersusceptibility to certain protein substances is a condition which may give rise to a variety of clinical manifestations. In deciding to what substances an individual is sensitive, skin tests are essential. Skin tests alone, however, may be misleading, and like every other form of laboratory investigation must be carefully checked by an adequate history and examination of the patient.

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Dr. J. W. Preston, Roanoke:—The whole question of sensitization to foreign proteids and kindred bodies is so broad, so complicated, and has so many ramifications that in the minds of even the best informed workers it is somewhat hazy, but is clearing by degrees to the extent that we now know that they certainly play an important role in phenomena, varying all the way from urticarias, eczemas, intestinal disturbances, hay fever, asthma, and like manifestations, to typical anapyhlaxis. There is evidence tending to show that in the same

individual the reaction may vary at different times from one of the above to the other.

Relative to the skin test, it certainly is a wonderful aid in certain cases, but, like many other new things, it possibly has been relied upon to too great an extent, and we are now beginning to find out that these cases fall into certain groups, some of which react and some do not, and a distinct advance will be made when these are clearly differentiated. A most interesting speculation is how far the proteins of focal infections may and do enter into the symptoms of some of these cases, and what the relative relation is between focal infections and say, for instance, ingested or inhaled foreign substances. No discussion of this matter is complete until the possible role played by the various internal secretions has been mentioned, for it is interesting, to say the least, to speculate upon whether or not such secretions be materially influenced by these bodies.

As to the matter of therapy, immunizing by the hypodermic injection of increasing doses of the substance believed to be at fault has certainly given brilliant results in a fair proportion of cases, but the percentage of failures has been greater perhaps than many realize. Certainly, a considerable portion of such failures might with justice be attributed to faulty diagnosis and technique.

While perhaps the progress has not been made in therapy that we would wish, one very material step forward has been accomplished, that is to say, the old idea of urticarias and like conditions being due to "uric acid" which has so long borne the burden has been very definitely disposed of in the class of cases under consideration.

Dr. Warren T. Vaughan, Richmond: Dr. Hutcheson remarked that the cutaneous test for sensitization to bacteria, as a rule, gave negative results. It has been my experience that frequently the bacterial proteins produce no reaction within the usual length of time but, after twelve hours or so, there is a well marked reaction, of a type that warrants further study. Certain it is, that there is such a phenomenon as sensitization to bacteria, whether the skin test is positive or not, as can be readily evidenced by the excellent therapeutic results from the administration of mixed autogenous vaccine in certain selected cases of bronchial asthma.

CHRONIC PANCREATITIS*

By ALEXANDER G. BROWN, JR., A. B., M. D., Richmond, Virginia.

The pancreas secretes an alkaline, thin, limpid fluid, varying from 500 to 800 cc. daily, according to the diet. This secretion passes into the duct of the pancreas, the canal of Wirsung. This duct commences at the tail of the pancreas and receives tributaries from various lobules until it opens in a common orifice with the bile duct into the intestine. This is called the external secretory system in contradistinction to the internal secretion which arises from the islets in the body of the gland and is taken up by peri-pancreatic lymphatic system.

This external secretion possesses a three-fold digestive power; trypsin, the protein enzyme; amylopsin, the strach enzyme; and lipase, the fat enzyme. The rate of flow is dependent upon the kind of food taken. The greatest output is obtained after a meal of bread, and the smallest after a meal of meat. The pancreas is thought to possess powers of adaption to the compositions of the food. After a meat diet, the proteolytic ferment is increased over the other ferments; after a fat diet, the lipase is increased over the other ferments.

Chronic pancreatitis, pancreatic calculi alone or with chronic pancreatitis or pancreatic cancer, may diminish or suppress pancreatic secretion. When this takes place to a sufficient degree, symptoms of imperfect or absent pancreatic digestion appear in the intestinal tract. Following this perversion of digestion of fats and proteins, there appears a characteristic looseness of the bowels or diarrhea. The occurrence in a patient of the passage of a number of loose bowel movemets, without evidence of blood or mucus or other signs of intestinal inflammation, is rather significant of disease of the pancreas. The stools of a patient with suppressed pancreatic secretion are usually heavy with fat, are light in color; are usually very bulky; are free from mucus or blood. The amount of fat in the stool and the number and size of the stools depend upon the sort and amount of food, as well as the degree of suppression of the pancreatic secretion. In some patients the stools pass as oily substance which on standing hardens into butter like masses; in some, the fat appears as cream-like masses. In the use of Schmidt's diet, which contains a very small amount of waste material but enough fat and rare meat for the purpose of testing the presence of fat or meat fiber in the stools, we have a useful aid in the investigation of cases with loose bowels where the presence of fat is not at once determined upon. This diet should be used for three days before reaching a decision. In this connection, it may be observed that, if doubt exists, the addition of 50 grams of butter or of bacon to the diet may disclose in abundance butter-like masses in the stools, signifying the absence of pancreatic secretion. As much as 73% of the fat intake, as shown by Tileston[1] is lost in the

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stools in patients with obstruction of pancreatic duct. Pratt[2] reports that in seven cases of obstruction of the pancreatic ducts he found the percentage of fat to range from fifty-three per cent. to seventy-three per cent. Normally the feces contain less than twenty-five per cent. of fat.

In connection with the symptom of loose bowel movements, the similarity of chronic pancreatitis and sprue should be kept in mind. Sprue is a disease of the tropics, showing "a peculiar inflamed superficially ulcerated exceedingly sensitive condition of the tongue and mouth; great wasting and anemia; pale, copious, and often loose, frequent and frothy, fermenting stools very generally by more or less diarrhea, and also by a marked tendency to relapse." While the occurrence of frequent loose and fat-containing stools discloses marked similarity to pancreatic suppression, the pancreatic changes pathologically have not been pointed out except recently by Dr. T. R. Brown,[3] who showed that in a case of typical sprue the ferments of the pancreas were absent and that with the administration of pancreatic extract the fat and loose stools were stopped. It is thought, therefore, that in certain cases of sprue, at least, there is a diminution or suppression of the pancreatic function. It is not known that this absence means organic changes in the gland, but the presumption is that such is the case.

Report of Case.

Mr. E. C. W. Honolulu, admitted March 19, 1921. Age 73, male, Civil State S; nativity, American; occupation, capitalist.

Complaint: "Bad stomach without gastric juice and indigestion." For last five months many loose bowel movements daily; lost weight.

F. H. Does not know anything about family; says he does not think there has ever been any cancer, T. B., or paralysis in any of his folks.

P. H. Patient has always enjoyed excellent health. Diseases of childen, exclusive of diphtheria and scarlet fever; no other diseases except sciatica a year ago. No history of serious injury except fracture of three ribs left side. Dysentery in Japan ten years ago.

P. I. For about ten years the patient has been suffering with indigestion. Just after meals a full sensation comes on and, if he does not get relief, it is followed by severe pain in the epigastrium. Meats and butter seem especially to bring on this trouble; soda relieves it, but the patient feels best on an empty stomach. The patient has been constipated for years until last summer when he passed a large formed stool and since this time diarrhea has been marked. No nausea or vomiting. No hematemesis, no blood in stools unless attended by hemorrhoids. The other day when the doctor was pumping out his stomach he got a small amount of blood back with the contents. In the last two and one-half years he has fallen off about 35 pounds. So much pain has been caused by eating that the patient has often gone hungry rather than suffer the consequences of eating; the appetite has always been good.

He has suffered recently with severe headaches generally over the head; this was attended with constipation and relieved when the bowels were opened. No vertigo. Eyes and ears negative. No sore throat except with colds, teeth are in pretty good condition.

No dyspnea, palpitation, edema, cough, hemoptysis, or night sweats. No nocturia except once a night. No poly- nor oliguria. No dysuria nor hematuria. Gonorrhea with relapses several times. No history of venereal sore. No caffeine; occasional use of alcohol, never regularly or in excessive amounts.

P. E. Patient is a well developed and well nourished white man. Except for a pigmented condition of the dorsal surface of the hands, the skin is normal. The hair is normal for his age. The post cervical and epitrochlear lymphatic glands are neither tender nor enlarged; the thyroid is of normal size.

Head of normal shape and size. Ears normal, mastoids not tender. Eye movements normal; pupils respond well to light and accommodation. Oral cavity is in good condition; the teeth are well preserved though there is much dentistry; the tonsils are negative, and there is no pharyngeal inflammation; the gums are slightly inflamed at places but there is no ulceration.

Chest. Cardiac impulse visible and palpable under 5th left rib about 4½ inches from the midline. The area of cardiac dulness is markedly enlarged to the left. There are no murmurs, however, and the heart sounds are

(1). Read Tileston. Trans. Assoc. Am. Phys. 1911-513.
(2). Pratt, Oxford Press, page 479.
(3.) The Absence of Pancreatic Secretions in Sprue, etc., by T. R. Brown, M. D., A. J. M. S., April, 1921. page 501.

of good tone. The lungs are normal on inspection, palpation, percussion and auscultation.

ABDOMEN. The liver dulness begins at the 5th right rib in the nipple line but does not extend below the costal margin: the liver cannot be palpated. Palpation of the abdomen is negative except for a small area of slight tenderness in the left lower quadrant: no masses whatever can be elicited on palpation. Percussion is negative throughout. Spleen is normal: there is no pain on deep pressure in lower epigastrium.

The extremities are negaitve. Knee jerk is sluggish on both sides: no ankle clonus, no Bakinski.

GASTRIC ANALYSIS.

Time (in min.)	30	45	60	75	90
HCl	0	0	0	0	
Total	7	6	20	10	Empty

URINALYSIS.

Sp. Gr.	Reaction	Albumin	Sugar	Blood
1023	Acid	Trace	0	+

Many hyaline casts

BLOOD

Reds. 4,784,000: White 6,000: Hem. 80%: Polys 82%: S. & L. Lym. 14%: Eosin. 2%: Trans. 2%.

Wassermann negative.

Feces negative for ova, parasites, or blood: positive for fats.

Blood pressure March 2, 1921, 128/80: March 19, 1921, 135/65.

Patient had sixty-four movements of the bowels in two weeks' stay in the hospital. In these movements there was a large percentage of fats.

COMMENT: The occurrence of the loose bowel movements, the loss of weight and body strength, the feeling of gastric and intestinal distress demand immediate attention. In this case, with a negative Wassermann and with a report of negative x-ray findings, the condition of the gastric function was rather interesting. The absence of free hydrochloric acid in any of the samples of the digestion of the test meal and the early evacuation of the stomach contents pointed to the stomach function and indicated the use of the hydrochloric acid in rather large doses. Upon the administration of hydrochloric acid with the meals, the first improvement was noted. The diet was the next step. The food was made free of fat. Pancreatic extract was administered with lactate of calcium. The relief from the symptoms of frequent large oily and fatty bowel movements was marked. The patient's general improvement was immedite; in six weeks, although well advanced in years (73), he traveled across the continent and to Honolulu, with progressive improvement and a gain of 45 pounds.

Stuart Circle Hospital.

THE TREATMENT OF ESOPHAGEAL SPASMS.*

By J. RUSSELL VERBRYCKE, JR., M. D. F. A. C. P., Washington, D. C.

Up to the present the writer has had the unusual opportunity of treating nearly 250 patients with esophageal spasms of varying degrees, most of which have been of the cardia. From the observation of results secured in this series it is believed that some deductions may be made. Some of the cases were treated before the present methods were employed and so the number who have been treated by mechanical means is somewhat reduced. So also there have been a number in whom some coexistent disease prevented the use of treatment for the spasm which would otherwise have been indicated.

In order to thoroughly understand the indications for treatment it is necessary to briefly review the etiologic factors and the course of the disease, or symptom complex known as cardiospasm, which is a constant or temporary abnormal contraction of the gastro-esophageal sphincter. Spasm of the sphincter occurs at least forty times more frequently than other contractions of the esophagus, so attention will be devoted principally to cardiospasm rather than to these other spasms.

Cardiospasm may be said to be in the first stage when there is a slight obstruction to the entrance of food or liquid into the stomach. The second stage is when food will not always go through and there is regurgitation. In the third stage, food has been retained so long and so often in the lower esophagus that sac formation has occurred from dilatation of the esophagus above the spasm.

In a former paper it was stated that a careful analysis of 100 of our patients showed that

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the main exciting causes fall into four groups, (1) neurotic, (2) reflex from disease elsewhere, as appendix or gall bladder, (3) irritative, as from local esophageal disease, and (4) toxic. In the treatment of cardiospasm, as in the treatment of other pathological conditions, an attempt should be made to remove the cause if possible. Mild or transient cases will generally be relieved by this alone. When a strong and persistent spasm has once become firmly established, however, removal of the cause is not sufficient to effect a cure. Habit has then come into play and the muscle has probably acquired the inherent quality of staying contracted and disobeying the natural law of contrary enervation by which the cardia is supposed to dilate as the rest of the esophagus contracts during the swallowing act. This is illustrated by the following case:

Miss P. J. S., age 24, was examined November 24, 1918, at which time she had had cardiospasm steadily for 5 weeks following an attack of influenza and pneumonia. There had been a slight attack one and a half years before. Nearly all nourishment had been regurgitated and there had been a loss of twenty pounds in the last month. There was occasional slight pain in the appendix region, soreness on walking, and tenderness well localized to the appendix. There was co-existent pylorospasm, as noted under the fluoroscope, and this could be induced by pressure over the appendix so that the assumption would be that the appendix was equally responsible with the toxins of the influenza in producing the spasm.

A moderately diseased appendix was removed and for two weeks she was better after which time the spasm recurred with full severity. The cardia was forcibly dilated with the Plummer water pressure dilator, using ten pounds of pressure. The effect was instantaneous, all symptoms stopping, but there was a recurrence in two weeks and another dilatation was necessary which was followed by perfect and permanent cure.

It is often true that a first or second stage spasm, that is before sac formation has occurred in the esophagus, gives more symptoms than high degree third stage cases, with immense false stomachs in the lower esophagus and with food retention for hours or often for days. These patients who have marked symptoms require other treatment than removal of the exciting cause. It is therefore necessary to treat the individual patient rather than any particular stage of the disease, although in general it may be said that nearly all third stage cases will require mechanical paralysis of the muscle before cure can be effected.

General Measures for all Cases.

Certain general rules of treatment can be laid down to fit all cases. The patient must be restored as nearly as possible to normal, both organically and functionally. This should be accomplished first by removing any possible cause of the trouble in disease elsewhere, second by removing any possible local irritation by giving a bland diet; third by endeavoring to secure a quieting of the nervous system in general by education, general upbuilding, and sedatives, as bromide or luminal.

Drug Treatment.

Apart from the above mentioned sedatives, in mild cases it is advisable to attempt cure by trying to bring about a better balance between the vagus and sympathetic nervous system. The principal drugs which may be tried are belladonna, suprarenal, pituitary extract and benzyl benzoate. Belladonna is known to be almost specific for certain spasms of the digestive tract. For esophageal spasm above the cardia it is very valuable. However, the results of its administration in real cardiospasm are very uncertain and generally disappointing. When given it should be administered to the physiological effect of producing dryness of the throat or dilatation of the pupils and, if it appears to be beneficial, it should be continued for several months in a dosage just under that sufficient to produce uncomfortable physiologic effect.

Theoretically, pituitary extract should be the drug of choice in cardiospasm as it is supposed to cause contraction of the broad musculature of the digestive tract, at the same time producing a contrary relaxation of the sphincters. I have noted some good results from its administration but unfortunately with no regularity and probably no more often than after suprarenal, which should theoretically make all sphincter spasms greater as the physiologic effect is supposed to be just the opposite of pituitary on the hollow organs and sphincters. I have had patients completely relieved after the giving of suprarenal. My experience, therefore, has led me to believe that we can not treat these spasms logically and with precision but must use these drugs em-

pirically, using one after the other, if necessary.

The last drug, benzyl benzoate, is supposed to act directly by relaxing unstriped muscle fiber. I must confess that I have found this drug in the majority of instances absolutely inefficacious in producing relaxation of either broad muscles or sphincters of any part of the digestive tract.

Mechanical Treatment.

If the foregoing measures have all failed to cure a mild spasm which is, however, causing the patient great inconvenience, the same sort of treatment should be instituted as is required in practically all cases of severe and persistent spasm before cure can be brought about, namely, forcible temporary paralysis of the cardia muscle by means of mechanical dilatation. By securing temporary paralysis and inability of the muscle to contract for some days, it is hoped to break the habit of contraction.

The most perfect instrument for this purpose is the Plummer water dilator, which consists of a tube like a stomach tube, with a whale bone staff in the center to make it stiff, a tip on the end, and just above the tip a rubber, sausage-shaped bag, the cavity of which communicates with the inside of the tube through a series of perforated holes in the latter. Over the rubber bag is a silk bag to retain the shape of the inside bag when it is dilated with water, and over the silk bag is another rubber bag to secure smoothness in passing down the throat. The other end of the tube connects with a Y, one arm of which is fastened to the water faucet and the other to a gauge.

It is always necessary to pass the instrument down the patient's throat with the tip threaded on a fairly strong thread which has been previously swallowed by the patient. The night before dilatation is to be attempted, the patient swallows about 8 feet of waxed silk twist or thread, little by little, so that it will go down the throat in a straight line. The following morning he swallows 4 to 6 feet more of the thread. The object of having the thread swallowed in two sessions in this manner is to avoid the possibility of having knots on the thread. In case the part swallowed during the evening has caught in the esophagus long enough to become knotted this knotted part is given a chance to pass on down so that the part swallowed in the morning will be unknotted as it is drawn tense by traction. The end of the thread passes out of the stomach and through a number of coils of the upper intestines in such a way that firm traction may be made on the thread without pulling it up. The thread will serve as a guide for the dilator and, if held perfectly taut, the dilator will, when its tip is threaded on the thread, be guided in a perfectly true direction through the spasmodic contraction. Without the help of the thread in guiding the dilator, it would be impossible to use sufficient force to push the dilator through the spasm in many instances without grave danger of perforating the esophagus. I have seen a number of instances of long standing spasm in which the lower esophagus was tortuous and made a sharp angle before entering the stomach. In these instances the dilator could not possibly make the turn without the thread as a guide. Again, there are many cases in which the lower end of the esophagus is dilated and a pouch formed completely surrounding the spastic muscle which remains as an elevation in the center, so that any instrument introduced from above will enter the pouch much more readily than the small opening in the center.

Technique of Dilatation of the Cardia.

The tip of the dilator is threaded on the silk thread and after moistening the rubber bag of the dilator with either plain water or glycerine, it is started down the throat in the same manner as a stomach tube excepting that it is necessary for the patent to keep the head bent well backward. When the tip of the dilator meets the spasm, the obstruction can be felt. Then, if the instrument is pushed down about three more inches, it will be in correct position with the middle of the rubber bag engaged in the spastic muscle. Another method of determining how far to introduce the dilator is by measuring the distance of the spasm from the teeth by introducing a stomach tube until it meets the obstruction and then putting a mark on the dilator at a corresponding position.

After the dilator is in situ, there is very little more discomfort felt by the patient from the tube being in the throat than would be felt from an ordinary stomach tube. Water is then allowed to flow slowly from the faucet into the instrument, dilating the rubber bag and at the same time indicating the amount of pressure

in the bag on the pressure gauge. As the bag fills with water, there is a strong tendency for it to be drawn into the stomach so that the tube must be held very firmly with one hand close to the patient's teeth. If this pulling sensation is not felt there is considerable doubt as to the dilator being right in the muscle. As the dilator is being filled and held in position in this way, each heart beat of the patient can be plainly felt against the bag.

Water is allowed to slowly continue flowing in until the patient complains of pain by raising his hand or the gauge shows that the desired pressure has been reached. The average amount of pressure will be from 12 to 18 pounds. There are many patients who can not stand a pressure of more than 8 pounds. No matter how little pressure is registered on the gauge, if the patient experiences pain, the pressure is immediately lowered or there would be danger of rupture of the esophagus. In the absence of pain, it is no easy task to be able to determine just how high to carry the pressure. Too little pressure, by failing to entirely paralyze the muscle, will result in failure to cure, while too great pressure will cause rupture. It must again be emphasized that the occurrence of pain necessitates immediate lowering of the pressure. It is generally my practice to retain the pressure reached for some seconds after which the pressure is released and the tube withdrawn an inch or so and the pressure again raised to the same point. This is done in case the instrument may have been introduced too far and have missed a successful stretching at the first time. The dilator is then withdrawn, the thread cut close to the teeth and swallowed.

At first we used cocaine on the throat, but it is rather difficult to obtain satisfactory anesthesia and there is very little difference between passing the instrument down the anesthesized and unanesthesized throat, so that we have abandoned the use of cocaine except in case of a very irritable throat.

In cases where there is marked food retention, the esophagus should be washed out before the dilatation to prevent any possibility of aspiration of food.

It not infrequently happens that after the dilator is withdrawn blood is seen on the rubber bag or the patient expectorates some bloody mucus. A small amount of blood need not excite any alarm and, in fact, I rather like to see it as it shows that we have obtained a fairly high degree of dilatation.

It occasionally happens that one or more of the bags bursts from the amount of pressure used. Ordinarily, this will give no trouble for, if all of the bags burst, the water will simply run out into the esophagus and stomach. If the inside bag bursts, the water will usually run back through the hollow tube when the pressure is released. In one instance, however, I had a very embarrassing experience by a very small rupture occurring in the inside bag high up, above the spasm. The water filled the outside rubber bag which refused to burst and settled in the lower part of the bag which was below the spasm, assuming the size and shape of a lemon. The more that effort was made to withdraw it, the more the water was forced into the extreme lower part. What I should have done would have been to have put the patient in the reclining position so that the water would have run up hill and out of the tube. I did not think of that at the time and was forced to pull this large dilated bag up through the esophagus, using a considerable amount of force and with considerable shock to the patient. I think that another time I would be able to handle this complication, should it occur.

Immediate Results.

Immediate results of this operation are most spectacular, in fact I know of nothing in medicine or surgery which is comparable with it. Patients who have not been able to swallow with comfort for weeks, months or years can at once partake of a large meal with perfect comfort, except for a slight soreness which may continue for several days. Their surprise and gratification is unbounded. Within the past year we treated a young farmer from near Baltimore, who had not eaten a meal in comfort for nearly three years. Immediately after the operation he departed for home but stopped in Baltimore for his lunch. When he felt the meal enter his stomach without difficulty his joy so overcome him that he broke down and cried.

Practically every case which is successfully done will be immediately improved.

Permanent Results.

When the operation is successful, the sphincter muscle has been temporarily paralyzed and is incapable of contraction for possibly a

week. By this paralysis we hope to, and usually do, accomplish a breaking up of the habit of contraction. In the course of a week or possibly longer, however, a certain number of cases will recur, in that the muscle again regains its power and goes into abnormal contraction. In these instances it is necessary to again paralyze the muscle. Each time that it is done there is more likelihood that the results will be permanent. I believe that it is possible to ultimately cure every case of cardiospasm.

We have to date treated 50 patients by this method. Of this number 30 were dilated once; 12 were done twice; 5, three times; 1, four times; 1, five times; and 1, six times, which is the greatest number of times that it has been necessary to treat any patient.

Of the 50 patients, 9 were in the first stage; 23 in the second stage; and 18 in the third stage, with marked sac formation in the esophagus. Of this number 28 have been apparently permanently cured; 9 have been very much improved, so much so that they see no necessity of having further treatment, although they occasionaly feel some slight manifestation of the spasm; 5 were only temporarily or slightly improved; and 8 were unimproved.

Of the 28 cures, 18 were cured by one dilatation; 4 by two; 3 by three treatments; 1 each by three, four and six treatments.

The 9 cases who were much improved might almost be called cured. Of these 3 were treated once, 5 twice, and 1 three times.

The other two groups of cases, those temporarily or only slightly improved and those unimproved, 13 in number, can be explained mostly upon the ground of either insufficient dilatation, refusal of the patient to continue with the treatment, poor technique or inability to get into the spasm, and poor choice of patients. In several instances it is very questionable whether the instrument passed the cardia and the patients refused further trial. Lastly, there was a small group of patients in whom the cardiospasm was only incidental to many other complaints. In some of these instances actual cure of the spasm took place, although because they continued to have some symptoms they were placed in the group of unimproved.

It is a well known fact that there is a certain type of neurotic individual who must have trouble of one sort or another. In these people it has been recognized for some time that actual disease may be removed, as when a manifestly diseased appendix is removed and yet the patient may either have symptoms in the same place or transferred elsewhere. We have learned some time ago not to operate on these individuals for their chronic troubles unless the symptoms were definitely those of the diseased organ in question. From our experience with cardiospasm we have reached the same conclusions in this trouble. Some patients will have spasm of high degree accompanied by dilatation above the spasm, as demonstrated by the x-ray. Treatment will relieve the spasmodic contraction and the patient is undoubtedly improved organically and functionally, as shown by both passage of the stomach tube and the x-ray, and yet the patient may go on having symptoms similar to those he had before or will develop new ones. We have unfortunately tried to dilate some of these patients with the result that they are placed to our credit as unimproved.

I think that it may be safely said that every patient who has a well marked cardiospasm giving symptoms and who is not a "neuro" may be permanently cured by the mechanical treatment, if done properly and repeated as often as may be indicated.

Dangers of the Operation.

So far our mortality is nil. So also, morbidity is nearly nil. In one instance we traumatized the larynx rather severely so the patient was hoarse for about ten days. In another we produced considerable traumatism of the pharynx with swelling and intense pain. Twice there was a moderate degree of shock and in one other patient a great deal of pain at the cardia, which lasted for several days. In only one was there a hemorrhage which was rather profuse in amount. This constitutes our total morbidity. As a rule, the patients come to the office for treatment and return home afterwards.

When one has had experience with the instrument, it is not a difficult procedure. But it is not something to be attempted lightly by one who has not had previous experience with it. The operation calls pre-eminently for an experience and the exercise of the judgment which comes only from experience. One obtains after a certain time a delicacy of being able to feel what is going on during dilatation just as a more experienced fisherman can tell often what sort of fish is on the line.

I must confess that I had done a number of dilatations before I ceased to have a feeling of dread before the operation and a feeling almost of mild shock afterward from the strain under which I was working. Even now after having performed the dilatations a great many times, if several weeks go by without having done it, I have more or less the same sensations when again doing it.

Contra-Indications.

We have been compelled to refuse to dilate a number of patients who had conditions which would contra-indicate dilatation. Thus, many of our patients have had aneurysm. In fact, there have been so many patients who had a high degree of cardiospasm together with dilatation of the aorta that it would seem that there might be some common causative factor. So also in cases of high blood pressure it is unwise to dilate the cardia unless absolutely necessary. It has been demonstrated that the simple passage of the stomach tube is capable of causing a rise in blood pressure of from 40 to 60 mm. of mercury. Serious heart trouble would contra-indicate the use of the dilator.

Cancer of the esophagus might produce serious hemorrhage and traumatism if forcible dilatation were tried. It is, therefore, necessary to be very careful in ruling out this condition in making the diagnosis. So also other obstructions of the esophagus, as by a tubercular abscess surrounding the esophagus, cirrhosis of the liver with varicose veins in the lower esophagus, and possibly other conditions, should be ruled out, else death would very likely result from attempted dilatation.

When cardiospasm of such high degree exists as to endanger life through inability to retain food, then it becomes necssary to choose between the danger of the trouble itself and the danger of attempted cure in the face of one of these other conditions being present. One must not forget the rule attributed to Hippocrates, "If you can not do good, at least do not harm."

I will close by emphasizing the fact that cardiospasm is not uncommon. It is often not diagnosed. The patients can be promised definite relief if diagnosis is made and correct treatment instituted. On the other hand, if the patient is denied this treatment, the majority of cases of more severe cardiospasm will never get well and not a few will prove fatal.

The Rochambeau.

CLINICAL APPLICATIONS OF BASAL METABOLISM DETERMINATIONS*

By JAMES H. SMITH, M. D., Richmond, Va.

The role of oxygen in metabolism is not a new study. The method of indirect calorimetry, in which heat production is measured by oxygen consumption, is comparatively new. In order that the subject may be set off clearly from certain other features of tissue oxidation, these will be briefly touched upon.

The respiratory quotient is the ratio of carbon dioxide output to oxygen consumption. Since it varies with the class of foods burned, oxygen has a variable heat-producing value. As a standard 0.82 is generally accepted as the normal respiratory quotient, giving to oxygen a caloric value of 4.83 per litre. With fixed standards, we are no longer concerned with the respiratory quotient.

"The vital capacity of the lungs:" This is a phase pertaining to the oxygen supply to the blood, whereas the metabolic rate may be said to fix the demand for oxygen. The vital capacity is the volume of a complete expiration, after the deepest possible inspiration.[1] It is influenced chiefly by pulmonary and circulatory defects without as a rule affecting the metabolic rate. Increased muscular exertion due to dyspnea, may be expected to cause moderate acceleration, and, indeed, in a few cardio-renal cases, metabolic rates have been found higher than could be explained on the basis of increased exertion.[2]

Several years ago it was established that the carbon dioxide tension of the alveolar air is equal to that of the blood serum, which latter is an index of the alkali reserve of the blood, thus affording a simple and clinically reliable measure of acidosis.[3] It is not unlikely that further studies will show significant relations between blood composition and total cellular metabolism. Peabody[2] found a considerable degree of acidosis in some of his cardio-renal cases with increased metabolism. The affinity of the blood for oxygen has been used as a measure of acidosis in cardio-renal disease with dyspnea.[4] Metabolism determinations were not made in the studies reported by Lewis.

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Lawrence J. Henderson[5] speaks of the blood as a physico-chemical system, and states that no change can be made at any point without producing changes at all points. The concentrations of free and combined oxygen, of free and combined carbonic acid of the serum, of serum chloride, and of the hydrogen ion represent six variables, for which in a given blood, when values are assigned to any two, the values of the other four are determined, and the condition of equilibrium unequivocally defined.

Barcroft[6] found that coincident with the secretion of saliva by the submaxillary gland, the oxygen used by the gland is increased seven times.

Indirect calorimetry, then, dealing with the end result of oxygen consumption, has interesting relationships with intermediate phases of oxidation, both physical and chemical.

The adjective, "basal," as applied to metabolism, signifies the minimal heat production. All purposive activities of the voluntary nervous system are excluded, and those also of the involuntary system as far as possible, approximating the "vegetative" state without the digestive and absorptive processes. To this end, the time selected is about twelve hours after the last meal, and the patient is kept at rest in bed for a half hour. Conversation and all disturbing factors are reduced to the minimum. Thus it is endeavored to determine the minimal oxygen consumption per minute, and its relation to the normal, for the patient's height, weight, age and sex, after corrections for temperature and barometer have been made. A ten per cent. variation above or below normal is not regarded as pathological.

With few exceptions, the basal metabolic rate is affected by only two conditions—fever and thyroid diseases. The exceptions are usually not difficult of clinical recognition. They include on the plus side certain cases of pernicious anemia, leukemia, diabetes, and the latter weeks of pregnancy.[7] In acromegaly, basal metabolism is found to be increased; and in hypopituitary conditions, the rate is below normal. These variations rarely exceed 20 per cent. in either direction. There is little doubt that Cushing's and Boothby's statements on this subject are based on due consideration of the functional relationships bewteen the thyroid and pituitary glands.

On the side of lowered metabolism, inanition from any cause may tend to reduce the rate.

The effect of fever on metabolism is important, in that the normal basal metabolic rate of a febrile patient can be arrived at only by inference, and the method has but little application in the presence of fever. Roughly stated, a rise of one degree F. in body temperature, results in an increase of metabolism of 10 per cent.[9] The converse, of course, does not hold. Very high metabolic rates due to overactive thyroids usually exhibit little or no rise in body temperature.

The "specific dynamic action" of protein and dextrose is frequently spoken of in recent years. By this is meant that, following protein feeding, and to a lesser extent carbohydrates, cellular metabolism is increased. At the insistence of Lusk,[10] in this country, the phrase will probably be limited in its use to the effect of ingested food, in order to avoid confusion with other heat-raising agents such as thyroxin and possibly suprarenin.[11] The selection of the post-absorptive stage for metabolic tests is with a view to eliminating the influence of the digestion and absorption of food.

In practice, the vast majorty of abnormal metabolic rates are attributable to the thyroid. The test is of value for:

(a) Differential diagnosis;

(b) Determining the severity of the thyroid condition and the treatment indicated;

(c) Estimating the results of treatment.

Overactivity of the thyroid has to be distinguished from nervousness due to other causes, and from chronic infections. Nervousness may be of a vague character difficult to define, or it may present the qualities of a special symptom-complex. The "effort syndrome" is likely to show an irritable heart action and vasomotor and secretory phenomena suggestive of hyperthyroidism. The pulse in the effort syndrome shows more tendency to fall to normal in repose, and the metabolic rate is normal.[12-11]

If "vagotonia" is to be regarded as a disease entity,[13] metabolism tests should prove helpful in picking out those with a thyroid element, and emphasis should be placed on the endocrine factor when present. Means[14] has tentatively suggested that the vagotonic types of thyroids are those which show a pulse slower in proportion to metabolic rate than do the sympatheticotonic cases.

XUM

In sections where goiter is endemic, coincident neuroses must often present themselves. At a recent county fair in the mountains of Virginia, in the most casual manner, I counted eight goiters in women. In this connection, Plummer's[15] statement is of interest: "That introduction of bacteria into the digestive tract is an important factor, if not the primary cause, of endemic goiter, is fairly well established." The metabolic test is especially helpful in those cases with manifest goiter, presumably of the simple type, and yet presenting symptoms or signs of hyperfunction.

A good deal of work has been done[16] to determine the effect on the thyroid of infections generally. Farrant[17] especially has reported in detailed and classified fashion a long list of infections in which the thyroid was studied clinically, at autopsy, and experimentally. The impression gained from the article is that the conclusions are reached on somewhat inadequate data, and, as far as I know, they have not been sufficiently confirmed in the seven years since his article appeared.

Bacterial infections may give rise to confusion as to thyroid activity in three ways:

1. The thyroid may itself become the seat of infection and a thyroiditis with increased functional activity result;

2. Symptoms of infection in other tissues, particularly chronic infections such as tuberculosis or focal infections, may simulate those of hyperthyroidism; or

3. Such chronic infections may, by a toxic effect on the thyroid, excite it to overactivity.

The last two observations apply most strikingly to tuberculosis. In another paper[18] I have called attention to the importance of recognizing pulmonary tuberculosis when it underlies a seeming or real thyroid condition. Although McBrayer,[19] on the basis of his studies, does not think either the metabolic rate or sugar tolerance promises much help in differentiating incipient hyperthyroidism and incipient tuberculosis, this question is not yet definitely settled.[22] However, the emphasis here belongs on recognition of tuberculosis by such means as we have, lest radical treatment be instituted for hyperthyroidism, when the latter is only secondary, or does not in fact exist.

On the basis of metabolism studies, it should be possible to control much of the speculation so rife in recent years, by which the most diverse states have been ascribed to lack of thyroid secretion. In cases of obesity particularly, it will be easier to recognize the genuine influence of thyroid poverty.

I am inclined to agree with Means[20] in that thyroid products should be sold to the laity only on prescription.

The metabolic rate, while not the sole criterion of operability, is doubtless the best single index of the severity of hyperthyroidism or the grade of myxedema; and the best single guide to treatment of both conditions. Experimental and therapeutic injections of known quantities of Kendall's thyroxin bear out this claim.[15] Crile[21] operates on cases clinically hyperthyroidal with normal metabolism. No doubt his wide experienece justifies his position. This does not alter the value to the average clinician of a knowledge of the metabolic rate when determined by competent technique. It may not determine his ideas of therapy, but it may help to guide him in the application of the views he holds. If operation is to be done, the crest of the wave of intoxication can be avoided, and the time can be better selected. These considerations hold no less for exophthalmic goiter than for hyperthyroidism, or the toxic adenoma of Plummer. Though it is generally recognized that there is something more to exophthalmic goiter than mere hyperthyroidism, and that treatment of any kind does not afford the same measure of relief, yet the thyroid remains as the pathological keystone, and affords the only present effective point of attack.

In those peculiar thyroid cases presenting signs both of over and under activity, probably representing abnormality not only of the thyroid, but of other endocrine glands, basal metabolism estimations should prove very helpful. Once or twice in the past, I have been a good deal at a loss to know whether the patient needed thyroid extract or treatment to reduce the activity of the gland.

The final value of the test is to know the results of whatever treatment is employed. If ligation or radiation has been done, the results can be determined and the future course decided upon. If partial thyroidectomy has been practiced, any necessity for roentgen ray or radium exposures as an adjuvant is revealed. By checking the results obtained from time to time, a favorable outcome is more assured.

Summary. The role of metabolism studies in thyroid diseases has often been compared to that of the thermometer in febrile diseases; one

is a measure of heat production, and the other of the degree of temperature. Clinically, I think a still better comparison is seen in the determinatiion of urinary or blood sugar in diabetes; in both instances the findings confirm the diagnosis, indicate the degree of functional derangement, and guide the treatment. We will be led into error if we blindly follow any single laboratory study. But, if we intelligently correlate basal metabolism findings with other data, keeping an open mind as to future developments bearing on the interpretation of results, we may expect the test to take its place among our more important laboratory aids. At present, it seems fair to say that it helps to distinguish abnormal thyroid conditions from other diseases, to guide us in our treatment of recognized thyroid disease: and to indicate what has been accomplished by the treatment followed.

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CLINICAL SYNDROMES OF VASCULAR CRISES*

By WM. H. HIGGINS, M. D., Richmond, Va.

In any comprehensive study of diseases of the vascular system, there will be found a group whose pathological basis may be identical, yet whose clinical manifestations may be entirely dissimilar. These pathological changes may share in common the same etiological factors, but vary only in the part of the vascular system which may be involved. Since it is probable that arteriosclerosis is preceded by an abnormal irritability of the vaso-constrictor mechanism, a proper interpretation of the underlying causes during the presclerotic stage is obviously desirable. The importance of the prompt recognition of these syndromes is clear when we realize that arterial disease furnishes the fundamental, morbid process in the larger number of deaths after the fortieth year.

The gravity of arterial degeneration is further shown by a decided increase in cardiovascular diseases during the last two decades. According to Elsner, this increase is greater the farther we are separated from hospital clinics. In five thousand cases of internal diseases seen by him in private practice, more

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than ten per cent. showed advanced arteriosclerosis. No age is exempt, as Andral, Fischel, and Chiari have pointed out that of all subjects examined in Prague, between the ages of two to twenty-five years, 48.7% showed evidences of beginning arteriosclerosis in the intima of the aorta.

It is not the purpose of this paper to deal with the various factors concerned in the production of arteriosclerosis or to discuss its general symptomatology. My interest, however, has been drawn to those types of vascular presclerosis not commonly met with in our daily practice. I refer to those in which the symptom-complexes are due to either local or general vascular contractions or narrowing of the arterial bed. The clinincal syndromes vary according to their location in the body, and on account of the similarity to other diseases, their interpretation is at times attended with considerable difficulty.

Several years ago, Pal introduced the term "vascular crises" to describe certain clinical pictures brought about by an over irritable vaso-motor mechanism. His contention was: "When the tension is produced by contraction in a definite vascular area, local consequences follow and dominate the picture. These are manifest chiefly by a peculiar painful sensation and local disturbance of function. General phenomena to a greater or less extent are present at the height of the tension."

He divided the vascular crises into (1) vaso-constrictor or hypertensive crises, and (2) vaso-dilator or hypotensive crises. Although his conclusions have been modified by later writers, his monograph forms the basis of our present knowledge of this subject. These vascular crises are probably of more frequent occurrence, and explain best a much greater variety of clinical signs and symptoms in so-called functional and organic diseases than we have hitherto admitted. They give rise to manifestations which are transient and tend to recurrence. These may be in the nature of pain or of disorders of function—motor, sensory, or secretory—singly or combined. They may be regional in their distribution, or they may be general in character.

The local spasms, affecting chiefly the extremities, are usually classified as purely vascular diseases, but, since they are so often indicative of a vegetative or central nervous lesion, they may not always be properly included under this heading. For example, there are the tonic hyperaemias, such as erythromelalgia, which is distinctly due to sympathetic stimulation, although its intermittent symptoms of pain, redness, and heat identify it with vascular diseases of an obliterating or spasmodic type.

We can recognize also the spastic anemias, such as Raynaud's disease, intermittent claudication, migraine, acroparesthesia, the chronic vaso-constrictor spots of Tracy, and the vaso-motor ataxia of Solis-Cohen. Here, the chief results are due to an intermittent vaso-constriction, yet there is considerable confusion as to their proper etiologic classification. Early vascular changes may well be one of the underlying factors, but as stated by Jelliffe, certain of these types are unquestionably related to the endocrinopathies, others to neuritic syndromes, and still others are exclusively psychogenic.

The conditions underlying these spasms are complex, and are far from being thoroughly understood. Wolfsohn has grouped the stimuli capable of producing these effects through the vegetative nervous system under the following headings: mechanical, chemical, emotional, and electrical.

In a normal individual, the blood supply to any part of the body is regulated in accordance with its functional needs by an adjustment between the vertebral sympathetic on one hand and the autonomic system on the other. Any variation in this vaso-motor equilibrium tends to bring about definite syndromes according to the structures involved.

Suffice it to say, hypersensitiveness from any cause in the vaso-motor system is promptly registered in the peripheral vessels. These recurring fluctuations may be of only temporary moment, but their effect on the vascular system may be such as to produce definite circulatory disturbances. Of these, the most constant and far reaching are the degenerative changes in the capillaries themselves.

Pal further pointed out that a vascular spasm may explain the sensory symptoms in pure anginal attacks, some cases of Adams-Stokes' phenonemon, the evanescent muscular pains in subjects of arteriosclerosis, and cerebral angiospasms producing transient paralyses or aphasias. He produced evidence to show that the crises of tabes in cases associated with hypertension may be best explained in this manner.

In lead poisoning, he attributed the usual

symptoms of headaches, convulsions, coma, the transient amblyopias, the colic and anginoid attacks to one common denominator—a marked rise in blood pressure associated with more or less localized spasm.

In this compilation of diseases having in common the same physio-pathological mechanism, there is a closely related group which I desire to discuss in more detail under the caption, GENERAL VASCULAR CRISES IN CHRONIC HYPERTENSION.

Whatever difference of opinion may exist concerning the cause of high blood pressure, it is generally conceded that the chronic hypertensive state may be a gradual one, and in fact may exist for many years without producing symptoms. During this period it is well known that the freedom from discomfort is due to two factors. The heart undergoes a compensatory adjustment and not only increases in size, but also increases its efficiency to meet the extra requirements. The arteries likewise exercise their reserve power and undergo certain proliferative changes. In many instances, the kidneys are only slightly involved and show a functional output well within normal limits. This period of well being, however, is limited, and the usual sequel in cases of this type is familiar to every one. Sooner or later, demands on the heart resulting from stress and strain of a continuously elevated pressure outrun cardiac adaptability, and exhaustion of the heart muscle supervenes. In some cases, an intercurrent infection or an unexpected apoplexy may be the final episode; or, again, the nephritis may assume the major role. Recently, Elliott has described a clear cut circulatory syndrome under the name of "high blood pressure stasis." In this type of circulatory failure the blood pressure formula remains but little altered despite the increasing circulatory embarrassment, and until the inevitable antimortem fall in pressure occurs, there exists the anomaly of a failing ventricle with a sustained blood pressure.

After eliminating these types of circulatory disturbances in chronic hypertension, there remains another group which in many respects is distinctive and worthy of our consideration. During the past year I have been impressed with certain clinical entities which seemingly may be catalogued as a separate class. The patients as a rule are those who possess an unstable nervous system, and in whom the usual symptoms of high blood pressure are frequently not pronounced. There is generally a history of comparatively good health until there will be periods of days or weeks when intermittent attacks of numbness or tingling will be complained of in one or more of the extremities. Fleeting pains will be felt in various parts of the body and there may be a sense of weakness or dizziness at intervals. In two instances, there was a history of transient amblyopia associated with a mild confusion of ideas. One patient experienced intermittent cramp-like pains of a definite anginoid type in the region of the precordium.

The physical findings in these cases were those usually present in a chronic hypertensive patient with a well compensated circulatory mechanism. There was no evidence of cardiac embarrassment, nor any condition suggesting a high blood pressure stasis. Between the attacks, the blood pressure formula was moderately high, but during the periods of acute exacerbation, there was a sharp rise in both the systolic and diastolic readings, varying from twenty to forty mm. Hg. over their average height.

The following history, in which only the essential points are given, will serve to illustrate the type under discussion.

White woman, age 56, was referred to us in November, 1920, on account of sudden attacks of vertigo, pains over the body, and weakness. Her family and personal history contain nothing of significance. She states that for the last two or three years she has been subject to darting pains in various parts of the body, at times becoming rather acute in the region of the precordium. During these attacks, which may last for several hours, she has been unable to stand, but as a rule she is only dizzy, extremely weak, and complains of numbness in one or more of her extremities.

She was kept under observation for several months, during which time she was examined frequently, both at the height of the attacks as well as in the interim. The only difference between the physical findings at the two periods was in the arterial tension. During the quiescent stage, her blood pressure averaged one hundred and sixty, systolic, and ninety diastolic. Studies on her blood and urine indicated no extensive renal pathology. With the onset of the acute symptoms, the pressure rose from forty to sixty points in both the systolic and diastolic phase.

We have here a remittent type of circulatory

disturbance which differs not only in its clinical course with the more common forms of circulatory failure in chronic hypertension, but also one in which it is believed there is a different pathologic mechanism.

According to Moschowitz, evidence is accumulating to show that chronic nephritis with hypertension is a primary vascular disease, and that in many instances lesions of the terminal branches of the arterial system are demonstrable even before gross lesions of the kidneys are manifest. He and others have shown that this arterio-capillary fibrosis is merely the localized and prominent manifestation of a generalized capillary and vascular disease. Furthermore, his observations lend support to the belief that hypertension is not of renal origin, but rather that it is one of the factors in the production of this arterio-capillary fibrosis.

It seems reasonable, therefore, to assume that in some instances of chronic hypertension, one of the many vaso-motor stimuli capable of causing a general hyperirritability of the peripheral vascular system may be present, and produce the clinical picture under discussion. In the local spasms, it has been shown that such changes may take place. Raynaud's disease, for instance, is due to a persistent or intermittent vaso-constriction resulting eventually in gross arterial degeneration in the affected area. Intermittent claudication is an angiospastic syndrome whose chief pathology is found in the arterial system, yet there is reason to believe that other causative factors precede these changes. With this underlying basis, it does not seem difficult to explain the general manifestations which occur when a wide spread arterio-capillary spasm has taken place.

The importance of the differentiation of these various types of circulatory disturbances in high blood presssure subjects is not only of pathologic interest but, from a therapeutic standpoint, it is of vital significance. Whereas digitalis is the chief medicinal agent in the usual types of cardiac failure and blood pressure stasis, it is needless to add that in the vascular crises of chronic hypertension, its use in contraindicated. For the same reasons, the administration of the nitrites in the reverse conditions may prove of help in one and danger in the other.

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THE EARLY RECOGNITION OF ACUTE APPENDICITIS*

By E. L. KENDIG, M. D., Victoria, Va.

In presenting this paper I am aware that I am considering a disease well understood by the profession, I realize that its curative treatment represents one of the greatest accomplishments of modern surgery, and I full appreciate the fact that I will add nothing material to the sum total of the knowledge already to be had on this subject. I wish, however, in this paper to give a brief outline of the course of acute appendicitis, to emphasize the importance of operating early in these cases to insure the best results, and mainly to discuss the causes which prevent early operation in a large percentage of cases. It is possible that the knowledge of what has been accomplished in determining the cause and in the treatment of appendicitis has made us, as a profession, less diligent in striving to obtain the lowest mortality.

Fifteen years of active general practice has impressed me with the fact that the early recognition of acute appendicitis concerns first and mostly the family physician.

Until 35 years ago there was a lack of definite knowledge of the pathology of appendicitis and its relationship to the clinical symptoms, and consequently there was no rational treatment. Fitz was the first to give a complete and definite description of the disease, introduced the name appendicitis, and advocated in no uncertain terms timely surgical intervention. Many other writers have contributed largely to our knowledge, but it is a singular fact that the man who first fully described this disease, and gave it its present name, should advocate at the same time the present accepted method of treatment.

In order to more fully discuss the early

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recognition of acute appendicitis, it would be well to recall a few of the important points of this disease. The appendix is a blind tube, with lumen narrowest at the cecal junction. It has a strong elastic submucous coat, and this layer will, for a considerable time, retain the products of infection in the lumen. This submucous layer is absent in children, and this is thought to be the cause of the variability of the symptomatology of acute appendicitis in children. The arteries to the appendix are of the terminal variety, the best blood supply being on the side of the meso-appendix. Some women have a small connecting artery between the appendix and the ovary, and it is believed that this extra blood supply is the cause of appendicitis being less frequent in women than in men. Also, it is thought that this blood vessel explains the connection between certain disturbances of the female reproductive organs and appendicitis.

The initial stage of acute appendicitis represents an infection within the appendix in the submucous coat. As a result of irritation from this infection there is developed a hyperactivity and a hyperperistalsis of the small intestine with generalized more or less colicky pain over the abdomen. A feeling of nausea and vomiting quickly follow this peristaltic disturbance. After a few hours the infection in the appendix ceases to cause irritation, and the hyperperistalsis subsides, relieving the nausea and vomiting. The generalized abdominal pain leaves, and pain, muscular spasm, and tenderness become localized over the appendix. Before the end of the first 24 hours, systemic reaction against the infection brings on fever and leucocytosis. Murphy emphatically emphasizes the following chronologic sequence of symptoms of acute appendicitis as practically an unvarying picture: (1) Pain, (2) Nausea and vomiting, (3) Local sensitiveness, (4) Elevation of temperature, (5) Leucocytosis. In the second 24 hours of the attack, one of the three following processes usually takes place, unless operated upon: (1) Drainage of the contents of the appendix back into the bowel, (2) Gangrene, (3) Perforation. In the first place, there is a subsidence of the symptoms. In the second and third cases, the entire clinical picture is changed from an acute appendicitis to an intraperitoneal abscess with inflammation or exudation.

These classic cases of acute appendicitis are almost universally recognized. Unfortunately, a large number of cases are not so clear. The early pain may be slight and temporary; often there is no nausea or vomiting; tenderness in the right side may be hardly perceptible, and spasm of the muscles may be so slight that it can be recognized only by a very experienced man. The result is that many cases of early acute appendicitis are watched for several days before a definite diagnosis is made.

In all cases of acute abdominal pain the physician should consider appendicitis. Nichols, of Boston, says that appendicitis outnumbers any other acute abdominal lesion ten to one, and that in cases of recognized acute abdominal infection, it is up to the doctor to prove that it is not appendicitis, rather than delay for the sake of making an absolutely certain diagnosis. We should also remember that the early stages of pneumonia, especially in children, may very closely resemble appendicitis. A careful examination of chest should always be made.

In making a diagnosis of acute right abdominal lesions, we should differentiate appendicitis from the three next most prevalent infections in this locality, viz., acute diseases of gall-bladder, acute disease of right kidney, and perforation of the gastro-intestinal tract. Murphy's clinic used with success the "hammer stroke percussion" and "deep grip palpation" to determine infection of gall-bladder and "fist percussion of right kidney" comparing this kidney with left, to determine infection of right kidney. When apparatus is available, catheterization of right ureter is a valuable aid in recognizing kidney infection. To determine perforation of the intestines, the "piano percussion" over the bowels is useful. It is also very important to palpate each iliac fossa simultaneously. In looking for muscular spasm, always compare the two sides. It is obvious that no morphia or other opiates should be given a patient with abdominal pain until after an accurate diagnosis has been made. It is not always possible for patients in isolated parts to have the benefit of a blood count in the acute stage of the disease. This may be due to the fact that the family physician may have such work done by another physician or at some laboratory, which takes time, or that the patient is some distance from attendant's office. However, leucocytosis taken in connection with the other symptoms, is one of the best evidences of acute appendicitis, and a

blood count is the most accurate means in determining the pathology of the disease. Heyd states that in order to give proper consideration to the blood count, we must assume some figure of count as the highest number occurring in the normal. He states in any normal condition the leucocytosis may not be in excess of 10,000 and the greatest polynuclear cells present not above 75 per cent.

Wilson says that the polynuclear percentage is an index of infection; the total leucocytosis is an index of body reaction; the proportionate relationship is an index of resistance. It is to be remembered, however, that in differentiating acute appendicitis from other acute abdominal inflammations, the blood count gives no real help. And it is also to be remembered that we may have a case of acute appendicitis followed by perforation and peritonitis, with neither pain, tenderness, spasm, vomiting, or high blood count. These cases, however, are rare and usually give a history of a previous attack and develop what is called by exprienced men a "peritoneal look".

It is conceded from the operative result of appendicitis during the last 35 years that all cases seen within the first 24 hours and all cases seen in the second 24 hours, with but few exceptions, should be operated on at once. Bancroft reports a series of 584 cases operated on with a mortality of 4.2%, of which there was a 0.83% mortality in cases without drainage and a 6.8% mortality in the drained cases. Worf and Coffey report a larger percentage of deaths in similar cases, the reports covering a series of cases of 822 and 13,445 respectively. Murphy states that every death from appendicitis is chargeable directly to the people for not calling the doctor soon enough, to the doctor for not recognizing the disease soon enough or not referring the case to the surgeon soon enough, or to the surgeon for not operating soon enough. The difference between operating as soon as the case develops and waiting is the difference between a less than 1% mortality and a 5 or 6% mortality. A diagnosis of acute appendicitis can usually be made at the home without the use of laboratory or other special equipment. It may be necessary, in order to determine some cases, to have blood count made or the right ureter catheterized. This can in most cases be arranged for without much trouble, if found necessary. In case of positve diagnosis of acute appendicitis, the patient should be given benefit of operative measures at once. In case of doubt or inability to secure the necessary information to make a positive diagnosis, the patient should be given the benefit of the doubt and placed where diagnosis can be more definitely made and operation performed, if indicated. Who then is responsible for the delay in operating on a large percentage of these cases? Bancroft reports in a long series of cases that 35% had developed localized abscess or spreading peritonitis before admission to the hospital. It is found from the reports of the hospitals throughout the county that a similar condition prevails, that a large percentage of cases of appendictis have developed localized abscess or spreading peritonitis before admission. It is hardly necessary to state that the use of purgatives in these early cases is responsible for rupture in some cases. It is true, perhaps, that the surgeon sometimes is responsible for delay in operating on these cases after admission to the hospital, from one cause or another, but, as proven by these statistics, the delay in too large a percentage of cases was caused before the patient came into the hands of the surgeon. The fault then lies largely with the people for not calling a physician soon enough, or with the family physician for not recognizing the condition soon enough, or, when recognized, for not giving the patient the benefit of operative measures soon enough. The public is slowly being made to recognize the importance of calling a physician early in case of acute illness. Public educational measures have done much in this direction, but the family physician can do more. It is the duty of the practicing physicians of this State to lose no opportunity in impressing upon their patients the advantages of early attention in acute cases. The responsibility, therefore, for getting cases of acute appendicitis operated upon in time to subject the patient to the least danger, rests mostly upon the shoulders of the first attending physician. My experience as a general practitioner, coupled with the operative results in these cases, has convinced me that we should give this matter the consideration it deserves.

It is the duty of the whole profession to help educate the public as to the necessity of calling a physician early, and it is the duty of the first attending physician to bear always in mind the probability of acute appendicitis in all acute abdominal diseases. When in doubt, give the patient the benefit of the doubt and

put the patient where operative measures are available, should they be indicated.

If we will do that, we will, in a large measure, reduce the present death rate of acute appendicitis.

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THE OPERATIVE TREATMENT OF DUODENAL ULCER*

By ARTHUR S. BRINKLEY, M. D., Richmond, Va.

In discussing this very important subject, in which every surgeon is intensely interested, I wish to state in the beginning that my opinion is that our views in regard to the operative treatment of duodenal ulcer will undergo a decided change within the next ten years.

At present, the writer is doing three types of operations for this condition. First, perforation with cautery and simple suture; second, excision of ulcer and pyloroplasty according to the technique of Horsley; third, excision of ulcer with cautery and posterior gastro-enterostomy, using the type of operation which seems best suited for the case after the abdominal incision has been made and an inventory taken of the stomach and duodenum with their surrounding viscerae.

It is recognized that extremely unsatisfactory results are often obtained when gastro-enterostomy is done for duodenal ulcer and, judging from the reports of the surgeons doing pyloroplasty almost exclusively, it is apparent that the results are far from ideal. Probably the internist is better acquainted with these poor results, since the patient finally seeks him for whatever comfort he may be able to give. Very often after a gastro-enterostomy or pyloroplasty has been performed, the patient leaves the hospital feeling comparatively well from his rest in bed and proper dieting. The surgeon hearing nothing more from the patient concludes that the cure is permanent, but, if inquiries are made, it will be discovered in many cases that the family physician or internist has been sought for relief after a few weeks or months of gastric disturbances.

In reviewing the literature, the clinical results from gastro-enterostomy, when performed for either duodenal or gastric ulcer, are by no means perfect. D. C. Balfour says, "Although evidence is conclusive that surgery gives permanent relief in a higher percentage of cases and with less associated risk than any other therapeutic measure, it is also true that the surgical treatment may be made still more efficient." Frank Smithies, of Chicago, who has long been associated with large surgical clinics, in which gastro-enterostomy is the chief surgical method of dealing with gastric or duodenal ulcer, reports observations on 273 patients on whom gastro-enterostomy had been done for relief of dyspepsia. Smithies' 273 cases represent 226 patients operated on for gastric or pyloric ulcer, 12 for gastric cancer, and 35 for duodenal ulcer not involving the pylorus. Of this entire number he reports only fifty-seven, or 20.9 per cent., clinically complaint free; twenty-eight (80 per cent.) of the 35 duodenal ulcer patients had pain or distress, and many of this number had other symptoms such as gas, nausea, vomiting, or eructation. However, as the total number of cases is made up of (1) patients requested to return for examination regardless of their condition, and (2) patients who came voluntarily because they were having trouble, the percentage of cures represented is too low. These results as reported by Smithies certainly cannot be considered satisfactory so far as curing the patient is concerned; still, in certain types of cases, especially where the pyloric end of the stomach and duodenum are fixed by induration and adhesions or an ulcer so large as almost to encircle the duodenum, obstruction to the pylorus from induration and edema, gastro-enterostomy is the only operative procedure I know that can be accomplished under such existing conditions, although the end-results as proven by statistics and my own personal experience are not always satisfactory.

Mayo's no-loop method of gastro-enterostomy with which every surgeon is familiar and which is fully described in Binnie's Surgery, Seventh Edition, page 370, is always employed when gastro-enterostomy is indicated.

Pyloroplasty has found favor with a number of eminent surgeons throughout the country and, while the preliminary reports have

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been very gratifying, it remains to be seen what the end results will be since this operation has only recently been done to any great extent.

G. B. Eusterman, of the Mayo Clinic, who is undoubtedly in a position to speak authoritativly regarding the end-results of this operation, makes this statement in an article entitled, "Diagnostic and Therapeutic Aspects of Late Sequelae of Gastric Surgery," which appeared in the JOURNAL OF THE A. M. A., Oct. 15th, 1921, Vol. LXXVII, page 1248. "My experience with the end-results of several hundred well executed pyloroplasties, many performed under favorable circumstances, has not been encouraging. Recurrence of ulceration in the suture line, adhesions to adjacent viscera, induration, contraction and narrowing, which provoke faulty pyloric mechanism and serious functional disturbances, in the absence of adequate obvious cause, are occasional sequelae. My answer to the charge that gastro-enterostomy is an unphysiologic procedure is that at least 15 per cent. of all pyloroplasties eventually prepare a rich soil for a highly successful gastro-enterostomy. It is reasonable to believe, therefore, that time and an enlarged experience will temper the present laudable enthusiasm for pyloroplasty."

The two methods most commonly used at present are, first, a pyloroplasty combined with gastroduodenostomy described by J. M. T. Finney, of Baltimore, and second, a pyloroplasty described by J. S. Horsley, of Richmond. Of the two operations I prefer the latter because in this operation not only is the ulcer excised but the stomach is returned to as nearly a normal physiologic condition after post-operative convalescence as it is at present possible to do with any plastic operation on the pylorus. This operation, however, has a limited field, in cases when there is a great deal of induration around the pyloric end of the stomach and duodenum; when the duodenum and pylorus are fixed by adhesions, when there is a large perforating ulcer involving the first part of the duodenum, and when the ulcer is situated more than one inch from the pylorus, it cannot be accomplished with any degree of ease or safety.

Several years ago, W. J. Mayo called attention to the curative effect of perforation showing that after perforation and recovery of the patient from the peritonitis, the ulcer heals. Later, D. C. Balfour has reported excellent results obtained by treating gastric ulcer with the cautery. I quote him as follows: "From a technical standpoint excision by cautery accomplishes much in a simple way which is not true of excision by knife. It is a common observation that the induration around an ulcer is out of all proportion to the size of the crater and that excision sacrifices along with the actual infected area the protective induration with which nature attempts to wall off the infectious foci which exist in the crater. Our experience with the cautery has shown that this wide excision is just as unnecessary as it is in the treatment of infectious foci elsewhere, and that the indurated area can be restored to a healthy condition by destruction of the crater and thorough heat sterilization of the surrounding tissues, as the cautery is held in the punctured crater." In a later article on the "Surgical Treatment in the Bleeding Type of Gastric and Duodenal Ulcer," he further emphasizes the curative results obtained by this method of treatment.

From the small number of cases I have treated with cautery perforation and simple suture, I am led to believe that this method comes nearer approaching the ideal than any of the other surgical procedures and should be employed in all cases where the crater of the ulcer is sufficiently small to admit of thorough cauterization and suture without seriously obstructing the pyloric end of the stomach. It is certainly the least formidable of the operations now done for duodenal ulcer, it requires less time, thereby reducing the danger from the anesthetic, the continuity of the stomach and the action of the pylorus are not interfered with, there is no spreading of the infection like one would get with knife excision and pyloroplasty, the end-result, is anatomically and physiologically nearer perfect than that obtained by any of the other present day surgical procedures.

SUMMARY.

1. There is no one specific surgical procedure by which all duodenal ulcers should be treated.

2. Perforation by actual cautery and simple suture of the wound is the method of choice in all cases adapted to this method.

3. Pyloroplasty comes next nearest leaving the stomach and duodenum normal from a physiological and anatomical standpoint but its field is limited.

4. Certain types of duodenal ulcer must still be treated by doing gastro-enterostomy regardless of what we think of it.

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RECURRING VOLVULUS OF DESCENDING COLON AND SIGMOID FLEXURE WITH MEGACOLON.

By MURAT WILLIS, M. D., Richmond, Virginia.
Professor of Clinical Surgery, Medical College of Virginia.

The following case, referred to me by Dr. Douglas Vander Hoof, presents an interesting and, I believe, not very uncommon condition.

Mrs. L. B. W., white, widow, school teacher, age 45, complains of "stomach trouble," rheumatism and neuralgia. Family history not significant, except that the patient's mother died of tuberculosis. Patient states that she has "never had a strong stomach;" even as a child, she had to be very careful as to her diet. Suffered from attacks of abdominal pain which would come on early in the morning and last from one to ten days. No attacks of this character for two years until recently, when two occurred, characterized by severe diffuse abdominal pain, unaccompanied by fever or vomiting. Last attack was four months ago. Bowels constipated as long as she can remember; stools appear normal. Normal weight 125 pounds; today weighs 118.

Examination reveals a patient who is well nourished and does not appear sick. Teeth and gums are in good condition; remnants of tonsillar tissue which do not appear diseased. Heart and lungs negative; blood pressure, systolic, 130; diastolic, 90. Abdomen large; symmetrically distended; no dulness of the dependent portions. No tenderness or masses. Urine shows a slight trace of albumin; gastric analysis negative.

The history of the recurring attacks of pain suggested the probability of a diseased appendix, and, in the absence of definite findings elsewhere, an exploratory operation was deemed advisable.

March 21, 1918, under ether anesthesia, the patient was operated on. A grossly diseased appendix was removed. In addition, the transverse colon was found enormously dilated, appearing to be at least six inches in diameter and having very thin walls. No obstruction of any kind could be discovered to account for this dilatation. It was immediately recognized that the intestinal condition must be one of congenital idiopathic dilatation of the colon: this serving to explain the history of obstinate constipation and abdominal distention. We believed the diseased appendix was sufficient to account for the attacks of abdominal pain, and this, coupled with the fact that the patient's general condition seemed unaffected by the enlargement of the gut, led to the decision not to attempt radical measures. The post-operative course was uneventful and patient was discharged in good condition April 20, 1918, with instructions to report at frequent subsequent intervals.

April 29, 1918, patient returned to hospital and was examined roentgenologically by Dr. D. D. Talley, the results of this examination confirming the observation as to the dilatation of the colon. The three pint barium enema was completely lost in this portion of the bowel.

December 12, 1918, the patient reports that she has been very well up to the past few weeks, when she began to be troubled with frequent loose stools and attacks of abdominal distention; looks well and has good color.

May 13, 1919, patient weighs 124.5 pounds. Looks very well and has had no abdominal symptoms except attacks of flatulence and four months ago had a "bilious attack," characterized by nausea without pain.

October 13, 1919, patient looks exceedingly well. Complains of occasional attacks of nausea.

January 3, 1920, patient still has some flatulence, but looks very well.

April 17, 1920. About two weeks ago, had one of her "gas spells," rendering it necessary to wear a kimono all day. Takes a lapactic pill and mineral oil every night.

August 21, 1920. Patient admitted to Johnston-Willis Sanatorium with the history that for about two weeks she has been suffer-

ing with great abdominal distention, accompanied by severe pain in left side, nausea, and occasional vomiting. Bowels obstinately constipated.

Examination shows patient moderately sick; abdomen tensely distended. White count 10,800; pulse 98; temperature 99.5 F.

August 22, 1920, proctoscope inserted and rectal tube introduced, resulting in passage of much gas and relief of distention.

August 31, 1920. Operation: Under ether anesthesia, a left rectus incision was made about 7 inches in length. The descending and part of the transverse colon was found enormously dilated. While the remainder of the large intestine was somewhat smaller, even this part of the gut seemed to be about six inches in diameter. Apparently about midway the transverse colon, there was a sharp line of demarcation between the extremely dilated gut and the remainder, while the mesentery of the former was similarly sharply differentiated, being dark in color and showing hemorrhagic areas. The cause of the obstruction from which the patient was suffering at admission was immediatly obvious. The elongated mesentery to the very much dilated portion of the gut rendered the intestine so mobile that when feces accumulated sufficiently in this portion, the weight was sufficient to cause the latter to fall downward and to the right, with a resulting angulation of the lower sigmoid, which was fixed; in other words, produced a volvulus. An analysis of the patient's history leads to the conclusion that this had occurred previously and to this occurrence, and not the diseased appendix, is to be ascribed the recurring attacks of abdominal pain, distention, and nausea. Schaaning[1] has recently reported two similar cases.

Believing the cause of the recurring attacks in my patient to exist only in the extremely dilated, mobile part of the gut, it was deemed sufficient to excise it alone, leaving the relatively less dilated ascending and part of the transverse colon. The vessels in the mesentery of this dilated part of the gut were first ligated and the intestine resected. An end-to-end anastomosis was then made, catgut sutures reinforced with silk being employed.

The part of the colon removed was enormously dilated, the greatest circumference being 26.7 inches; the total length being 36 inches. The walls were extremely thin, there being a complete absence of the mucular hypertrophy which constitutes a striking feature of many cases of Hirschsprung's disease.

The patient reacted well from the operation and four months later reported that she was completely relieved of the attacks of abdominal discomfort.

Dilatation of portions of the intestinal tract may occur in any part of it, but the most usual location of such dilatation is the colon. The dilatation may be the result of some obstruction, but in certain cases, there is no evidence of an obstruction existing prior to and giving rise to the dilatation. From the history of the early onset of obstinate constipation and the absence of any evidence of pre-existing obstruction, it is obvious that the case I have reported represents an instance of true congenital megacolon or Hirschsprung's disease.

Though Hirschsprung is often credited with having been the first to describe the pathological condition which bears his name, as a matter of fact, no less than twelve foreign and ten American reports antedate his paper, which appeared in 1886. To Parry is due the credit for the first published report of congenital dilatation of the colon, this author in

1825 having described the condition as encountered by him in the autopsy of an adult in whom it was present.[1] Eleven years later, Ebers reported a case and discussed the condition with remarkable fullness and clarity.

As the name indicates, the eitology of "idiopathic" dilatation of the colon is unknown. A number of theories have been suggested to explain its origin, but none of them is sufficient to explain all the reported cases. It seems advisable to disregard those hypotheses which are based upon the discovery of some definite obstruction as the cause. Cases where this obstruction was responsible for the dilatation are not instances of true Hirschsprung's disease; it is better to apply to them the term "pseudo-megacolon." Obtsruction not infrequently occurs not as a cause but as the result of the dilatation, as is well illustrated by the case I have reported. To explain the genesis of the true congenital megacolon, it has been suggested that a colitis may arise, either as a result of bacterial infection or dietetic errors. This colitis leads to injury of the intestinal wall, with a tendency to stagnation of the intestinal contents and the production of excessive amounts of gas. The pressure of this gas distends the weakened intestine and the ensuing dilatation renders the onward propulsion of the fecal mass difficult, so that hypertrophy takes place. In many of the reported cases, however, the colitis is only a late manifestation; appearing as a consequence and not as a cause. Hirschsprung in his earlier papers emphasized the congenital idea. He believed that the condition was a disease entity, due to some pathological process occurring in utero or arising from a congenital defect. The observation of Concetti in 1899 that there may be demonstrated a deficiency in the muscular coats of the large intestine lends support to Hirschsprung's contention. Formad suggested that there is faulty development of the neuromuscular apparatus of a segment, a theory supported by Bing and Hawkins. Finney[2] points out, however, that there is often, if not invariably, no demonstrable histological evidence of faulty innervation, the nervous elements constituting Meissner's and Auerbach's plexuses being apparently normal. The attempt has been made recently by Retzlaff[3] to revive this theory under a modified form. He believes from the study of a case occurring in a man of 46 years that he has been able to demonstrate the existence of a state of "sympathicotonus," the patient reacting very markedly to subcutaneous injection of adrenalin and being little affected by atropine and physostigmine. Since adrenalin acts selectively on the structures innervated through the sympathetic while atropine and physostigmine influence chiefly those which are innervated by the cranial autonomic, he infers that this patient had an increased irritability of the sympathetic nervous system. The sympathetic supplies inhibitory fibers to the intestine, and, since it is in a state of increased irritability, he contends that it will cause intestinal paresis and resultant dilatation. Kackel,[4] however, points out that this would fail to explain the subsequent hyperthrophy, and he reports a case that he has observed in a child of four and a half years where not only was the patient insusceptible to the dose of adrenalin that Retzlaff[3] found effective in his patient, but in Kackel's[4] case the dose of atropine which Sachs states to be ineffective in normal children produced a decided reaction.

From the appearance of the mesentery, with the dilated lymph and blood vessels, Finney[2] has suggested that we may be dealing with a

condition of "hypernutrition." It is obvious, however, that granting his contention, we have made no advance in explaining the underlying etiology.

As regards the pathological anatomy of the condition, there are generally both dilatation of the intestine and also hypertrophy of all the coats, though in a certain proportion of cases, mine being illustrative, the muscular hypertrophy is absent. It is the more common belief that the dilatation is primary, the hypertrophy occurring secondarily because of the difficulty of emptying the dilated portion. As a result of the fecal stagnation, there are encountered areas of degeneration or necrosis, the latter occasionally leading to perforation. In the reported cases, the dilatation has been very great; a diameter of six inches and a capacity of forty pounds in one case and a capacity of sixteen liters in a second. These dimensions were exceeded in my case, the greatest diameter being, 8½ inches. The dilatation may be present at birth, and in a case reported by Hobbs and de Richemont, it was so pronounced as to interfere with delivery. In other cases, it becomes prominent later in life.

The diagnosis is based upon the history of obstinate constipation alternating with periods of diarrhoea, together with the results of examination of the patient. In most cases of true idiopathic megacolon, the onset of symptoms dates from birth or very soon thereafter. In his review of the cases reported up to 1908, Finney[2] states that about 70 per cent. gave symptoms from birth; and about 20 per cent more developed them within a few weeks. The lapse of time without stool is almost incredible in some of the reported cases, being as much as three months in one instance. In many of the cases, this constipation appears to exert an injurious action on the patient's general condition, but in others, and this is illustrated by my case, there may be little or no disturbance of the health.

The characteristic feature found on examination is the abdominal distention. This may be extreme, at times so great that the abdominal circumference exceeds the patient's height. It is important to note that rectal examination may be entirely negative, the rectum not being involved in the dilatation. Other viscera may be displaced by the dilated colon, as illustrated by an interesting case recently reported by Carnot and Friedel.[5] In their patient, the heart displaced to the right of the midline, resumed its normal position after resection of the dilated portion of the colon. The malposition had been present so long, however, that the resumption of the normal position gave rise to circulatory disturbances, culminating in the patient's death the day following the operation.

About the only condition which may cause confusion is tuberculous peritonitis. The distention of tuberculous peritonitis is due, however, to the accumulation of fluid, and Finney[2] states that ascites has never been described in any of the reported cases of congenital megacolon.

Medical treatment can never affect a cure of the condition. If the constipation is amenable to the ordinary cathartic measures and the patient remains in good physical condition, it is probable that recourse to surgery is unnecessary. In other instances, where there is evidence of impairment of the health from the absorption of the decomposing mass in the intestine; or, as occurred in my case, a serious complication should occur, operative measures are distinctly indicated. The nature of these procedures must be determined by the conditions present in the individual case. In young patients, resection of the dilated gut and end-to-end anastomosis has given the best results. It seemed wiser in my case not to attempt such a radical operation; we were content with the removal of that portion of the intestine which seemed responsible for the recurring obstruction, leaving untouched a considerable amount of moderately dilated colon.

In conclusion, it is probable that if surgeons keep in mind the possibility of the occurrence of this condition and, in patients with a history of long-continued, obstinate constipation where physical examination reveals a much distended abdomen, subject the patient to careful roentgenological study, megacolon will be recognized even more frequently than it has been in the past.

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THE HISTORY OF MEDICINE IN THE SOUTH.*

By W. A. LEWIS, M. D., Enterprise, Ala.

At the outset, allow me to make the positive statement that the South has produced as many and as great names as have ever adorned the pages of the glowing history of medicine of any other country.

The name of Ephraim McDowell, the nervy, plucky pioneer surgeon of Danville, Kentucky, will go down in the annals of surgery as the greatest abdominal surgeon of all times. McDowell did his first ovariotomy in 1809; this was several years before the discovery of ether anesthesia and antiseptic and aseptic surgery. McDowell did a great deal of good work as a general surgeon that has entitled him to an enduring fame as one of the greatest surgeons of the world. He stands out as a successful surgeon and, notwithstanding the time in which he lived, overcame the handicaps that forced many timid men to quit. His work stands out pre-eminently as an inspiration to the profession of the entire world and points to better and higher ideals of life. By his original work he opened up one of the broadest avenues in surgery. This work is of such transcendent importance that it entitles the memory of his name to be cherished, not only by physicians, but by all the people of all the nations and of all times. The profession in the South has always taken a great pride in honoring the memory of Ephraim McDowell.

Robley Dunglison, of Virginia, teacher, writer and scholar, deserves a niche in the Temple of Fame. He taught three branches of medicine in the University of Virginia, later accepting the chair of Materia Medica in Jefferson Medical College, at Philadelphia. Dunglison was a voluminous writer on many different subjects. His crowning work was his Medical Dictionary, that served the profession in this country as a standard for many years, and is still in use.

Crawford W. Long, of Athens, Georgia, discovered ether anesthesia and removed a tumor from the neck of a patient under ether anesthesia in 1842. There are, however, other claimants for this honor. Wells, a dentist of Hartford, Connecticut, extracted some teeth of a patient in 1844 under nitrous oxide gas anesthesia. Jackson, a chemist and physician, in connection with Morton, a dentist and student of medicine in Harvard Medical College, worked together on ether anesthesia, Jackson making the ether and showing Morton how to use it. Morton made a public demonstration of ether anesthesia in the Boston General Hospital in October, 1846. The surgeon of the hospital, Warren, dissected a tumor from the neck of a patient under ether narcosis. This operation of Warren's was similar to Long's operation, four years prior. Illustrious authorities, like J. Marion Sims, claim Long was justly entitled to the discovery of ether anesthesia. Bill Arp, the noted Georgia writer and philosopher, claimed that the news of Long's use of ether was disseminated over the country, far and wide, somewhat like the shot on the British Regulars at the battle of Lexington, which rang around the world in an incredible short time. So Long's discovery was known in New England, but the details had not been published. The critics of Long do not deny his priority in the use of ether. This is, indeed, the greatest discovery of the world: the discovery of America by Columbus does not equal it. It is the greatest boon to suffering humanity. The discovery of anesthesia has made it possible to establish the great clinics of the world. The good that has been done, the suffering that has been alleviated, the lives of human beings that have been saved are beyond the conception of our greatest thinkers. Georgia has placed a statue of Long in the Hall of Fame in Washington. The University of Pennsylvania has erected a tablet in the hallway of the Medical Department of that great University to his memory. Compared to his great gift to humanity these are, indeed, but feeble efforts to commemorate the name of the great discoverer of ether anesthesia.

J. Marion Sims is the brightest genius of American surgery. He was born in South Carolina but settled at Montgomery as a young physician. He made his reputation at Montgomery. The slave owners in and around Montgomery were generous to him. He established at Montgomery the first female infirmary or hospital of the world, and did the plastic operations on women slaves that made him a success and brought him immortal fame. After acquiring his reputation as a great surgeon, he moved to New York City, where he could have broader fields and a wider scope in which to display his wonderful talent and

*Read before the Coffee County (Ala.) Medical Society, June 2, 1921.

skill. He was chiefly instrumental in building the Woman's Hospital of New York City, which was completed in 1857, and is the first hospital of its kind erected in the world. From this hospital has emanated the best obstetrical and gynecological teachings of the world. At the outbreak of the Civil War, Sims went to Europe. He did his operation of successful repair of vesico-vaginal fistula before the credulous Academy of Science of Paris. He was the first American surgeon to carry American surgery across the ocean to the old world.

Sims did more for the relief of women than any other man who has ever lived. By his energy and skill and genius, he established gynecology on a firm basis. Aside from his ability as gynecologist, he did general surgery and is due the credit for the first successful drainage of the gall bladder. This operation was done in New York in 1868. Bobbs, of Indianapolis, preceded Sims a few months in draining the gall bladder, but his patient died.

R. Battey, of Rome, Georgia, deserves honorable mention as one of the leading surgeons of the South. His operation of ovariotomy to induce an early menopause, has contributed largely to the development of abdominal surgery. Perhaps many surgeons have misunderstood the intentions of this operation. Battey, as a gynecologist, has been second only to men like McDowell and Sims. Battey enjoyed a wide reputation as a general surgeon.

W. W. Grant was born and reared near Seale, Russell County, Alabama. He fought in the Confederate Army and located soon after the war in Davenport, Iowa, to practice medicine. In December, 1882, he made the diagnosis of perforated appendix. The patient was a young lady school teacher. She had a purulent fistula in the right groin that soon began to discharge fecal matter. In January, 1883, he enlarged the opening, hoping thereby, to close the fistula, but this operation was a failure. May 14, 1884, he had Professor Andrews, of Chicago, in consultation with the express purpose of removing the appendix, but Dr. Andrews would not agree and suggested a counter opening in the lumbar region, which was done, this operation proving a complete failure. January 4, 1885, the abdominal cavity was entered, the appendix was ligated, but, on account of the many adhesions, was not removed. The ligation of the stump was thought to be sufficient to close the fistula, but failed. On May 14, 1885, another operation was done and the appendix was dissected out. The attempt to close the fistula at this time was unsuccessful. Dr. Grant moved to Denver, Colorado, and in 1891, successfully closed the fistula, making the fifth operation on this patient. Dr. Grant, in a letter to me says, this patient now lives in Minneapolis, Minnesota, and is strong and hearty. Kroenlin, of Switzerland, preceded Grant a few months in ligating the appendix, but his patient died in a few days. To Grant is justly due the first deliberate and successful operation on the appendix, in the entire world. May 14, 1885, he did a complete appendectomy, the first on record.

Grant's original operation for the removal of cancer of the lower lip, given out by him to the profession several years ago, has stood the test of time, and has not been improved on. Da Costa, in his Manual of Surgery, and Binnie's Surgery claim that it is the best operation yet suggested. He was the first to do an anastomosis of the facial nerve and spinal accessory for facial paralysis.

In this connection I will mention the work of W. E. P. Davis, of Birmingham, Alabama, who first suggested and succeeded in draining the gall ducts. This was a radical departure in the field of surgery and this innovation had a far reaching effect on the surgery of this day. Davis organized the Southern Gynecological Association. He, however, will be chiefly remembered by his original work on the gall ducts.

The South is distinctly the home of abdominal surgery; it was here it originated with Ephraim McDowell; it is in the Southland it has been developed by Sims and Davis. The leading world thinkers on this branch were southern men—McDowell, Sims, Davis and Grant. Abdominal surgery, of all the branches of surgery, is the most fascinating and calls for the very highest degree of skill. Anesthesia and abdominal surgery, both of southern origin, are the prime factors in the establishment and maintenance of the world's great clinical centers.

The name of Stonewall Jackson brings a sensation to every nerve and a thrill to every fiber. The Shenandoah Valley campaign has been immortalized by the fact that General Jackson gave to the world superb military tactics. The greatest thing of the Valley campaign, however, was its far reaching humani-

tarian aspects. The last of the battles of this noted campaign had been fought. Jackson had hit the enemy with such suddenness that they were completely routed from the battlefield, and the entire hospital outfit of the opposing forces was captured. He was to leave next day to join Lee, at Richmond, to help crush McClellan and many sick and wounded of the enemy were to be left. It was then that Dr. Hunter McGuire, of Virginia, the Surgeon General of Jackson's army, made the suggestion to General Jackson that the doctors and nurses of the opponents be returned to their posts of duty. Up to this time, all military hospital attendants, doctors and nurses were, by the rules of warfare, considered prisoners of war. This suggestion of McGuire's met a ready response in the great heart of Jackson and these people were returned to their posts of duty next morning. The returning of hospital attendants, or any physicians or nurses connected with the army, soon was accepted by Lee and Grant in the mighty struggles around Richmond. Later this humanitarian act of Dr. McGuire and General Jackson became a rule of the Hague Peace Tribunal, and one of the accepted rules of modern warfare. This wise suggestion and consummation of returning physicians and nurses engaged in military duty to their places is one of the first of the great forward events of the middle period of the last century, for sick, wounded and dying soldiers.

The work of Dr. McGuire, in the Civil War, in getting belligerents to return physicians, etc., to their commands, where they could render service, of Florence Nightingale, in organizing relief and the trained nurses' profession during the Crimean War, and of Henri Dunant, after his visit to the battlefield of Solferino, where 36,000 French, Austrian and Sardinian soldiers were left dead and dying on the battlefield, gave the inspiration for the organization of the Red Cross. These three notable outstanding events for the relief of suffering soldiers are deserving of the very highest tributes that can be paid to these great persons. It is with peculiar pride to us that our section of country took part in the initiation of this relief work.

Peter Bryce was born in South Carolina but came to Alabama in 1860, to organize the Insane Hospital at Tuscaloosa. He was placed at the head of the Insane Hospital of Alabama as its first superintendent. This hospital was named in honor of him. Bryce is the author of the non-restraint method of treating the insane. This method has been adopted by all insane asylums of the entire world. Up to this time, these unfortunate people were condemned to a life of suffering, bound with chains and fetters, in many instances put in dark and uninviting cells, and nothing was done for their relief. These methods were revolutionized and many insane people are today properly treated, their diseased minds relieved, and many are returned to their families happy and contented in life. So profound was Dr. Bryce's knowledge of the insane that his ideas have been inculcated in the jurisprudence of not only our country, but of Great Britain. His ideas are embodied in the decisions of the high courts of our country and of England. As an alienist dealing with insanity in all of its phases, Dr. Bryce is easily the best authority of the entire world. The insane hospital at Tuscaloosa is a model institution of its kind. Alabama and the entire South are fortunate in producing the man that has made such an impression on the minds of specialists on insanity of the world.

John Allen Wyeth was born and reared in Marshall County, Alabama, and fought in the Civil War with Forrest's Cavalry. Soon after his graduation in medicine, he located in New York City, where he has acquired a great reputation as one of the leading surgeons of the world. He is the author of the bloodless amputation of the hip joint, ligation of the internal carotid artery, treatment of inoperable blood tumors by the injection of boiling water. He discovered that the infection of sarcoma with erysipelas germs would cure this malignant disease. Wyeth organized and established the first post-graduate school in America, this being the New York Polyclinic. He has made a reputation as a platform lecturer, his lectures on General Robert E. Lee and Nathan Bedford Forrest having been heard and appreciated by many audiences. His Life of Nathan Bedford Forrest is considered by literary critics a gem.

Dr. Wyeth has met with unprecedented success in his chosen profession in New York City, but he has never lost his identity with his home, the Southland. He has always boasted of Southern birth and has taken great pride in the achievements of this section of the country. Dr. Wyeth has scaled the topmost rung of the ladder of Fame.

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William Crawford Gorgas was born at Mobile, Alabama, and reared at Tuscaloosa. Gorgas stands pre-eminently as the greatest health officer of all times. After the notable clean-up of Havana, Cuba, he was appointed as one of the commissioners to dig the Panama Canal. The French had failed to dig the canal on account of malarial and yellow fever. It is the claim of all authorities who know, that this was the deadliest place on the face of the earth. After Gorgas had cleaned up the Canal Zone, it was practically a health resort, and by his efforts he made possible the completion of the canal. The work of Gorgas in Cuba and the Panama Canal Zone has had a far reaching effect; this work conclusively shows that the white man can live and work in the tropics under sanitary rules. Great civilizations will teem in the rich tropics in the next few centuries. The world has been rid of yellow fever except three foci, and the Rockefeller Foundation will soon get these under control. The work of Gorgas and Cowarker is without parallel in the history of medicine for its immediate and ultimate good accomplished—yellow fever forever gone from the face of the earth, and a great stimulus to help eradicate malaria.

Gorgas was serving as Surgeon General of the army when we entered the World War. How quickly and efficiently he organized the medical department of the army astonished not only our people, but the people of all nations. The confidence reposed in him by the people and the profession, and his profound knowledge of the conditions and needs of the army, were the chief factors in such an efficient organization and made possible the excellent results obtained by our medical department in the great war.

Gorgas several years ago visited the Rand Mines, in southeast Africa, for the British Government, to study and report on the black water fever and pneumonia among the miners of that section. His report is treasured by the British Government as a classic and his suggestions very materially reduced the death rate in that country. He was on his way to fill another mission for England, that of studying and reporting on the fevers of the west coast of Africa, when stricken with paralysis, in Belgium. He was carried to London and was treated by the best talent of that city, but succumbed.

Dr. Gorgas was honored and revered by the people of the entire world. He did more to prevent diseases and suffering of the human family than any other man who ever lived. One of the large London dailies, in writing an obituary of Gorgas, paid him the distinct compliment of being the family physician of the world. When a dreaded pestilence would visit any part of the world and take its people off like flies, the immediate cry was, "Let's send for Gorgas." The profession in Alabama and the South has reached its culmination in Gorgas, Alabama's native son. At the last meeting of the State Medical Association of Alabama, a resolution was unanimously passed to place the statue of Gorgas in the Hall of Fame in Washington.

In this connection, I will briefly mention the work of Walter Reed, of Virginia, as the head of the Yellow Fever Commission, in Cuba, that proved conclusively that yellow fever was transmitted by the bite of a mosquito. This idea had been suggested by Carlos Finley, a Cuban doctor, but it remained for this Commission, headed by Major Reed, to establish this fact by actual experimentation. The United States Government has honored Reed's memory by naming a large hospital at Washington, D. C., The Walter Reed Hospital.

Joseph Holt, Health Officer of Louisiana for a number of years, devised a quick and efficient method of disinfecting ships. He did more for commerce and prosperity of the country than any other man. The adoption of Holt's method was a great saving in time and millions of dollars to the shipping interests every year. The South has assumed the leading role in matters pertaining to sanitation.

Malaria is wide-spread over a large section of the world. It is claimed by experts that the conquering soldiers of Alexander the Great carried malaria back to Macedonia and Greece and that this disease was responsible for the decadence and decline of ancient Greece. The same authorities claim that the Roman soldiers, returning from the overthrow and destruction of Carthage, came home infected with the malarial parasite and that malaria was the cause of the downfall of Imperial Rome.

Malaria has overthrown governments and changed the trend of history and has no doubt hampered the prosperity of our Southland more than any other cause. But Charles C. Bass, of New Orleans, has suggested a simple

and very efficient method of treatment with quinine that will finally eliminate malaria from our section of the country, and the entire world, provided this treatment is persistently carried on and followed up where any outbreaks of malaria occur. Dr. Bass was the first experimenter to grow malarial parasites in test tubes.

Dr. Rudolph Matas, an alumnus of Tulane University, has been Professor of Surgery at Tulane a number of years and is identified with the profession in the South. He created a great deal of enthusiasm among the surgeons of the world by his original operations on the vascular system and has opened up broad fields for speculation and thought by this work. His name will be transmitted down to posterity on account of his operation on aneurysms. Matas is one of the leading general surgeons. Dr. L. L. Hill said of him. "His mind is like the ocean, the waves of which touch the surgical thought of every question of his day."

Matas' most practical work was giving to the profession conductive anesthesia (i. e., nerve blocking). This is second only to Long's discovery of ether anesthesia. A great deal of general surgery is done under local anesthesia now and conductive anesthesia is, indeed, the greatest boon ever offered the dental profession.

L. L. Hill, of Montgomery, Alabama, scholar and surgeon, is due the consideration of the profession for his scholarly attainments. Dr. Hill has done three successful operations on the human heart—this is probably the world's records,—suturing the heart, removing a piece of darning needle three-fourths of an inch long from the heart, removing a cambric needle from the heart—all these patients making uneventful recoveries. The University of Alabama, in recognition of his great skill in operating on the heart, conferred on him the degree of LL. D.

The poor white trash of the South have always been ridiculed by the better-to-do whites, and all the negroes. They have been looked upon with disdain, as being indolent, shiftless, etc. Their pitiable condition was thought to be inherent. The first physician to take this subject up and give it the needed study, was Dr. H. F. Harris, of Atlanta, Georgia. He showed conclusively that the hookworms were responsible for this condition and advised treatment. He said that these unfortunate people could be made healthy and that the peach glow could be put in the cheeks of the boys and girls of these so-called indolent white trash, and that they could be made useful citizens of our country. The United States Government experts have confirmed the work of Harris. Much good has been done and many people in our Southern country have been reclaimed from poverty. If the proper efforts are continually put forth, the hookworms can be entirely eradicated from our country.

Abraham Flexner, a Hebrew, of Paducah, Kentucky, but now with the Rockefeller Foundation of New York City, has done a great deal by his discovery of the Flexner dysenteric bacilli and his serum for the treatment of this disease. His work on cerebrospinal fever and infantile paralysis, also the suggestion of the use of antimeningococcus serum in the treatment of cerebrospinal fever, entitles him to the consideration of the profession as one of the great minds of the world. Flexner's name will doubtless be written on one of the highest pinnacles in the Temple of Fame.

Dr. George B. Searcy, of Tuscaloosa, was the first to diagnose pellegra in this country: this was done at the Mount Vernon Insane Hospital for the negroes of Alabama, in 1906. Pellagra hung over the South like a mighty black pall for a number of years. Time is not sufficient in this short paper to go into the details of the discussions and work done on this subject. Goldberger, an Austrian by birth but in the United States service, conducted a number of experiments in Mississippi, that prove conclusively that pellagra is a nutritional disease and can be cured with a well balanced diet, and that people who subsist on a diet that contains all the elements of food, including a plenty of green vegetables and fruits, will not have pellagra. It has been shown later that vitamines play an important role. Goldberger's ideas, put into practice, will entirely eliminate pellagra from the face of the earth. Aside from this, the immense economical value of this work is beyond calculation for this section.

I can but barely mention the name and work of O. H. Schloss, of Eufaula, Alabama, who has suggested to the world the skin test for patients sensitive to foods containing a large amount of protein and especially milk, and methods of desensitizing these patients. This

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is a new and radical departure from the beaten paths and promises much good.

These are, indeed, stars of the first magnitude. I could mention many men in our profession who shine with less luster and I could write a whole thesis on that vast army of general practitioners who have adorned the profession in the South like the milky way on a star-lit night, if time permitted. While all could not shine in the firmaments of the profession with the brightness of these greater stars, yet, after all, it was a great professional band of earnest workers from the bottom to the top that has culminated in producing in our section of the country the illustrious names I have mentioned.

THE DETERMINATION AND SIGNIFICANCE OF THE HYDROGEN ION CONCENTRATION*

By E. C. L. MILLER, M. D., Richmond, Va.
Dean of Medical Faculty, Medical College of Virginia.

Introduction.

Life as we know it in this world is peculiarly dependent on water and on carbon. All life processes take place in water and most of the vital energy liberated is due to the oxidation of carbon. Because of this relationship, living matter, from the very first, has been in contact with and has been impregnated with carbonic acid. Now, carbonic acid and the acid carbonates have one almost unique property, namely they keep solutions neutral in reaction. Life has thus developed in a neutral medium and all its processes presuppose neutrality and are adapted to neutrality. Hence, any departure from neutrality makes trouble.

I can illustrate the ability of carbonic acid and the acid carbonates to maintain neutrality by data given in Henderson's book on the Fitness of the Environment. If we take one hundred litres of water containing one kilo of carbon dioxide and add sodium hydroxide in fifty gram portions, the reaction which at first is acid gradually becomes less and less acid as the fifty gram portions are added, gradually approaches the neutral point, and then passes it. The 150 grams that are added nearest the neutral point, part on one side and part on th other, increase the alkalinity from 0.7×10^{-7} to 1.7×10^{-7} or 2.4 times. If this same 150 grams of sodium hydroxide had been added to water it would have increased the alkalinity from $N/10^{7}$ to N/26 or 384,000 times, thus showing how the CO_2 prevents change in reaction—an increase in alkalinity. Or conversely, if we have one hundred litres of water containing one kilo of sodium bicarbonate, in equilibrium with an atmosphere containing one gram of carbon dioxide per litre, then on adding hydrochloric acid in fifty gram portions the reaction becomes less and less alkaline, gradually reaches, and finally passes the neutral point. The 150 grams HCl added nearest to the neutral point increase the acidity from 0.68×10^{-7} to 1.54×10^{-7} or 2.3 times. If the same 150 grames of HCl had been added to water it would have increased the acidity from $N/10^{7}$ to N/24 or 416,000 times. This shows how the bicarbonates prevent increase in acidity. The above variation from true neutrality produced in a solution of carbonic acid or an acid carbonate by adding 150 grams of either acid or alkali is much less than is found in good distilled water and less than we were able to even measure a few years ago.

Suppose one were to try to determine the reaction of either of these essentially neutral solutions by titration. You will see that all of the CO_2 or of the $NaHCO_3$ would react with the alkali or acid added until either it was all neutralized or until the particular hydrogen ion concentration had been reached at which the particular indicator you were using changed color. This brings out the difference between the real reaction, that is the hydrogen ion concentration and the titratable acidity or alkalinity. For the analytical chemist the titratable acidity is important but for most biological purposes the actual concentration of hydrogen ion, is the important thing.

The Determination of the Hydrogen Ion Concentration by Electrical Method.

The Chemical Theory.

Why does zinc dissolve in sulphuric acid?

$$Zn \text{ plus } H_2SO_4 = Zn\,SO_4 \text{ plus } H_2$$

Chemists say the zinc displaces the hydrogen. Zinc will also displace various other metals when placed in solutions of their salts, for Ex. iron and silver. Zinc in turn is displaced by magnesium and by potassium. (K, Mg, Zn, Fe, H, Cu, Ag). When tested out in this way the elements can be arranged in a series of decreasing displacement value so that any element will displace those below it in the series.

*Read and demonstrated before the Richmond Pathological Society.

Why are the elements thus displaced?

There is no adequate answer to this question but all the elements seem to have a tendency to go into solution; some have a greater tendency than others. Suppose that there is but one sulphate ion and a copper and a zinc ion are competing for it. The zinc has a greater tendency to go into solution and combine with the SO_4 ion and so the copper is forced out of solution and is deposited as metallic copper. So the elements and especially the metals are said to have a solution pressure or tension. This is a very anthromorphic and inadequate explanation but nevertheless it is the best we have.

If a zinc bar be immersed in a solution of $ZnSO_4$, the zinc bar because of its solution pressure sends zinc ions out into the solution. The zinc ions already in solution have a pressure corresponding to a gas pressure and usually called osmotic pressure. By this pressure they tend to deposit on the zinc bar and an equilibrium between the bar and the solution will be established when as many ions go out from the bar in unit time as deposit on it from the solution. This would be in some particular concentration of the solution.

When a zinc ion goes out from the bar into the solution it carries with it a positive charge of electricity. This makes the solution into which it goes just so much more positive and leaves the bar just so much more negative. As the zinc ions continue to go out into the solution, the zinc bar becomes more and more negative and the solution more and more positive. In this way there is built up an electrical potential between the bar and the solution.

As the bar becomes more and more negative and the solution more and more positive, it becomes increasingly difficult to send positive ions out into a positive solution and to separate positive ions from a negative bar because of the attraction of unlike charges and the repulsion of like charges. The zinc bar also attracts back to itself more and more the positive zinc ions in the solution.

By these two factors, the original concentration of the solution and the potential developed, a condition of equilibrium is soon established. You will readily see that the greater the original concentration of the solution, the less will be the potential developed, because fewer zinc ions will have to be sent out before equilibrium is reached.

In this way, the amount of potential that will develop depends on the original concentration of the zinc ions or conversely, the potential that develops can be used as a measure of the concentration of zinc ions originally in the solution. As a matter of fact, a zinc bar in a normal solution of zinc sulphate develops a potential of just about one-half a volt; the zinc bar being negative.

On the other hand, if a copper bar be plunged into a normal solution of copper sulphate, the solution pressure of the copper bar is less than the deposition pressure of the copper ions in the solution. The process is reversed, and so the copper ions tend to deposit on the bar until equilibrium is established. This also develops a potential between the bar and the solution but in this case the polarity is reversed, the bar is positive and the solution is negative. The voltage in this case is also about one-half volt; the bar being positive.

Now, if two such cells, zinc in zinc sulphate and copper in copper sulphate, be separated by a porous partition and the bars be connected across, a current will flow. This is the ordinary Daniell Cell that we learned about in physics. In this case the potential of each side being about one-half volt and of opposite signs the voltage of the combination is one volt.

Or, if we have a double cell so arranged that two zinc bars dip into two solutions of zinc sulphate which are separated by a porous partition, then if one solution is more dilute than the other, a higher potential will develop on that side and a current will flow. The current potential in this case will be the difference between the potentials of the two sides. This is the ordinary concentration cell.

All this is true not only of zinc and of copper but of all the metals generally, including hydrogen. If a bar of hydrogen be immersed in a solution of one of its salts, say hydrogen sulphate, a potential develops equal to about 0.28 volt; the hydrogen being positive.

If two such cells of different concentration be separated by a porous partition, a current will flow. If the potential of one side be known, the potential of the other can be calculated.

Hydrogen is, of course, of gas and so cannot be shaped directly into a bar, but advantage is taken of the well known ability of platinum black to condense or absorb large quantities of hydrogen on itself. Platinum black is deposited by reduction on a platinum

electrode; this is then saturated with hydrogen gas, and serves as a hydrogen electrode. Two of these electrodes plunged into acids of different hydrogen ion concentration will give a current when electrical connections are established.

Now, you will see that what we measure with a hydrogen electrode, the factor which determines the amount of potential, is the concentration of hydrogen ions in the solution.

This is not the same as the amount of acidity as determined by titration with an alkali. For Ex. sodium bicarbonate as you well know is slightly alkaline in reaction and yet it will absorb almost one-half its weight of sodium hydroxide when titrated with an alkali.

$NaHCO_3$ $NaOH$ Na_2CO_3 H_2O
87 40

Again, by varying the proportions of NaH_2PO_4 and of Na_2HPO_4, a solution can be made acid, alkaline, or neutral, and yet any one of these mixtures will absorb considerable quantities of either acid or alkali when titrated. Such solutions are spoken of as buffered and all the fluids and tissues of the body are so buffered. These body fluids are buffered, not only by the acid carbonates and phosphates but also by the proteins themselves.

Demonstration: Of how much more alkali is required to turn phenolthalein in one per cent peptone solution than in water. One drop turns it in ten c. c. of water, while nearly two c. c. are required to produce the same color in ten c. c. of one per cent. peptone solution.

The Indicator Method.

Hydrogen ion concentration can be determined approximately by the use of indicators. If to a series of tubes containing one per cent. of peptone, neutral in reaction, I add litmus and then increasing amounts of alkali and decreasing amounts of acid, I shall have a series that is blue at one end, red at the other, and graded in color between. The color of the litmus is a direct index to the hydrogen ion concentration in the tubes. If the hydrogen ion concentration of each tube be determined electrically and the tubes be so labeled, then we shall have a set of standards by which the hydrogen ion concentration of any unknown, within this range, can be determined. To do this we would add litmus to the unknown and then compare the color with this series.

Such series have been made but usually not with litmus as it does not keep well. Many new and valuable indicators have been produced in recent years that change color at various points. By making up several sets from carefully selected indicators quite a range can be covered. For example:

Brom-phenol blue covers a range from Ph	3. to 4.6
Methyl red covers a range from Ph	4.4 to 6.0
Brom-cresol purple covers a range from Ph	5.4 to 7.0
Brom-thymol blue covers a range from Ph	6.0 to 7.6
Phenol red covers a range from Ph	6.6 to 8.2
Cresol red covers a range from Ph	7.2 to 8.8
Thymol blue covers a range from Ph	8.2 to 9.8

Demonstrate use of comparator block.

Demonstrate Standard Sets of Indicators.

The Arithmetical Expression of the Hydrogen Ion Concentration.

Something should now be said, perhaps, about the expressions used in indicating the hydrogen ion concentrations.

We all know that in a normal solution of an acid there is one gram of acid hydrogen. If all this hydrogen were ionized we would have a normal solution of hydrogen ions. Hydrogen ion concentrations are expressed as fractions of this hypothetical normal solution. For example, we speak of 1/5 normal, of 1/100 normal, or more simply as N/5 or N/100.

Dilute solutions run into several figures so N/1000 is often written as $N/10^3$ or more simply as 10^{-3}. The hydrogen ion concentration of pure water or the neutral point is one ten millionth normal or $N/10^7$ or 10^{-7}. Twice this concentration would be $2x10^{-7}$ and one-fourth this concentration would be $0.25x10^{-7}$. These are rather unusual and awkward numbers to hold in mind or to work with and so it has become customary to write simply the logarithm of the denominator when the concentration is written as a fraction.

For example,

N/5 is Ph 0.7
N/10 is Ph 1.0
N/100 is Ph 2.0
$N/10^7$ is Ph 7.0

When Ph is written other than as a common fraction it may be converted to a fraction and then the log. of the denominator looked up. For example,

$\overline{2}x10^{-7}$ or $2xN/10^7=2N/10,000,000=N/5,000,000=$Ph 6.7.

$0.25x10^{-7}=0.25N/10,000,000=N/40,000,000=$ Ph. 7.6

See the conversion tables.

In the actual testing of an unknown by the electrical method, it is not convenient to use two hydrogen electrodes because the known

side is not sufficiently constant and accurately known. Usually, a calomel electrode is used because it is convenient and of constant voltage. In this case the gas chain formula would be

	:		:		:		:	
Hg	:	HgCl	:	KCl	:	HX	:	H
	:		:		:		:	

By suitable electrical equipment, the resulting voltage can be measured and the difference between this and the voltage of the Calomel Electrode gives the potential of the unknown and from this the hydrogen ion concentration can be calculated.

Proceedings of Societies

PRELIMINARY PROGRAM

Twenty-fourth Annual Session
of the
Tri-State Medical Association
of the
Carolinas and Virginia.

Norfolk, Virginia.
February 22-23, 1922.

OFFICERS—SESSION 1922.

Dr. W. W. Fennell, Rock Hill, S. C.....President
Dr. J. T. Burruss, High Point, N. C.....Vice-President
Dr. H. R. Black, Spartanburg, S. C.....Vice-President
Dr. Karl S. Blackwell, Richmond, Va.....Vice-Pres.
Dr. James K. Hall, Richmond, Va.....Secy.-Treas.

EXECUTIVE COUNCIL

One Year Term

Dr. F. C. Rinker.....Norfolk, Va.
Dr. W. O. Spencer.....Winston-Salem, N. C.
Dr. Julius H. Taylor.....Columbia, S. C.

Two Year Term

Dr. W. L. Peple.....Richmond, Va.
Dr. J. P. Matheson.....Charlotte, N. C.
Dr. Chas. A. Mobley.....Orangeburg, S. C.

Three Year Term

Dr. J. T. McKinney.....Roanoke, Va.
Dr. C. O'H. Laughinghouse.....Greenville, N. C.
Dr. D. L. Smith.....Spartanburg, S. C.

LOCAL COMMITTEE OF ARRANGEMENTS

Representing the Norfolk County Medical Society

Dr. Southgate Leigh, Chairman
Dr. W. E. Driver
Dr. M. N. King.
Dr. Jas. W. Hunter,
Dr. F. D. Wilson,
Dr. G. B. Byrd.

Representing the Chamber of Commerce and the Board of Trade

Mr. F. R. Ford,
Mr. A. P. Long,
Mr. W. A. Parker,
Mr. R. D. Davis,
Mr. Chas. McDermott,
Mr. N. S. Horton.

PRELIMINARY PROGRAM

Wednesday, February 22, 10 A. M.

Place of Meeting: Monticello Hotel.

The Association will be called to order by Dr. Southgate Leigh, Chairman of the Committee of Arrangements.

Invocation—The Right Rev. Beverley D. Tucker, Bishop of Southern Virginia.

Address of welcome on behalf of the City—Hon. A. L. Roper, Mayor of Norfolk.

Address of welcome on behalf of the Norfolk County Medical Society—Dr. C. J. Andrews, President of the Norfolk County Medical Society.

Response—Dr. Frank M. Lander, Williamston, S. C.

President's Annual Address—Dr. W. W. Fennell, Rock Hill, S. C.

PAPERS

"Duodenal Ulcer and Cholecystitis." By Dr. Warren T. Vaughan, Richmond, Va.

"Acute Perforation of Duodenal Ulcer." By Dr. George H. Bunch, Columbia, S. C.

"The Spleen in Surgery." By Dr. Carrington Williams, Richmond, Va.

"The Treatment of Chronic Empyema." By Dr. F. S. Johns, Richmond, Va.

"Repeated Perforations of the Small Intestine of Undetermined Origin." By Dr. S. S. Gale, Roanoke, Va.

"Surgical Research." By Dr. John B. Deaver, Philadelhia, Pa., (Invited Guest).

"Some Points of Differentiation Between Kidney and Intra-Abdominal Lesions." By Dr. A. J. Crowell, Charlotte, N. C.

"Torsion of the Spermatic Cord; with Gangrene of Testicle. Case Report." By Dr. Hamilton W. McKay, Charlotte, N. C.

"The Differential Diagnosis of Some States of Torpidity." By Dr. Tom. A. Williams, Washington, D. C.

"Pertinent Considerations in Hypertension." By Dr. W. W. Silvester, Norfolk, Va.

"The Treatment of High Blood Pressure." By Dr. Garnett Nelson, Richmond, Va.

"Reconstruction Surgery." (Illustrated by Lantern Slides and Moving Pictures). By Dr. F. H. Albee, New York, N. Y. (Invited Guest).

"Therapeutic Impressions." By Dr. Ivan P. Battle, Rocky Mount, N. C.

"Reflections on Medical Ethics." By Dr. Davis Furman, Greenville, S. C.

"Some Further Observations and Reports of Cases in the Instillation Treatment of Enuresis in Childhood." Br. Dr. William R. Barron, Columbia, S. C.

"Group or Rather Co-operative Practice." By Dr. J. E. Rawls, Suffolk, Va.

"Torsion of Appendices Epiplociae—Case Report." By Dr. Samuel Orr Black, Spartanburg, S. C.

"Cancer Propaganda." (Illustrated with lantern slides and moving pictures). By Dr. J. W. Long, Greensboro, N. C.

"The Course of Recovery Following Operation for Permanent Facial Paralysis." (Lantern slides). By Dr. C. C. Coleman, Richmond, Va.

"The Surgical Treatment of Facial Neuralgia."

(Lantern Slides.) By Dr. Addison G. Brenizer, Charlotte, N. C.

"The Relation of Modern Dentistry to the Practice of Medicine." (Lantern Slides.) By Dr. Guy R. Harrison, Richmond, Va. (Invited guest.)

"Blood Pressure in Pregnancy." By Dr. J. N. Upshur, Richmond, Va.

"Auto-Transfusion." By Dr. Charles S. White, Washington, D. C.

"Sarcoma of the Long Bones." By Dr. James W. Gibbon, Charlotte, N. C.

"Increasing Use of Narcotic Drugs by Members of the Medical Profession." By Dr. W. C. Ashworth, Glenwood, N. C.

"Psychoanalysis." By Dr. W. A. White, Washington, D. C. (Invited Guest.)

"The Value of Psychoanalysis to the General Practitioner." By Dr. Louis E. Bisch, Asheville, N. C.

"Rambling Remarks in Re Appendicitis." By Dr. Stuart McGuire, Richmond, Va.

"Headaches with Especial Reference to Those Due to Sinus Infection." By Dr. H. C. Shirley, Charlotte, N. C.

"Don't Convict your Patient on Circumstanial Evidence." By Dr. Lesesne Smith, Spartanburg, S. C.

"Some Disturbances of Pernicious Anaemia other than Blood Changes." By Dr. Henry A. Christian, Boston, Mass. (Invited Guest.)

"Report and Discussion of Urological Cases (Polycystitic Kidney)." (Lantern Slides.) By Dr. N. Bruce Edgerton, Columbia, S. C.

"Management of Urological Cases." By Dr. Joseph F. Geisinger, Richmond, Va.

"Uretero-Pyelography." (Lantern Slides.) By Dr. Stanley H. Graves and Dr. S. B. Whitlock, Norfolk, Va.

"Neoplasmata of the Clitoris." By Dr. Frank D. Worthington, Charlotte, N. C.

"Nitrous Oxide-Oxygen, Analgesia and Anaesthesia in Obstetrics." By Dr. G. Bentley Byrd, Norfolk, Va.

"Tuberculous Joints." By Dr. Alonzo Myers, Charlotte, N. C.

"A Study in Pericarditis." By Dr. W. B. Porter and Dr. F. M. Hodges, Richmond, Va.

"The Value of Early Exploration in Obscure Intra-Abdominal Conditions." By Dr. D. T. Tayloe, Washington, N. C.

"Surgery and the Haemophiliac." By Dr. J. H. Taylor, Columbia, S. C.

"The Tax-Supported Doctors' Propaganda for Socialized Medicine." By Dr. M. Eugene Street, Glendon, N. C.

"A Criticism of the Prohibition Law." By Dr. R. E. Hughes, Laurens, S. C.

"Practical Use of Current Medical Literature." By Dr. M. L. Townsend, Charlotte, N. C.

"The Surgical Significance of Pain in the Left Side of the Abdomen." By Dr. R. L. Pittman, Fayetteville, N. C.

"Silent Stones: Report of Cases." By Dr. W. Lowndes Peple, Richmond, Va.

Information.

Norfolk is abundantly supplied with first-class hotels. The Monticello Hotel will be headquarters of the Association. There are also other hotels, as follows: The Lorraine, the Southland, the Fairfax, the Atlantic and the Victoria.

The Association may tax the hotels to their capacity, and you should reserve a room at once.

Arrangements have been made for lantern slide work, and a competent operator will be on hand, consequently any paper may be illustrated if the author will furnish the slides.

The members of the Association will be entertained as well as instructed at the meeting, but the entertainment features will be announced later. All members who wish to bring their wives and daughters with them to Norfolk may feel assured that they will be most cordially welcomed by the wives of the Norfolk physicians.

Members of the Tri-State will recall the royal welcome Norfolk has extended to us in the years gone by.

The serious business of the meeting, however, is the discussion of medical problems, and the hope is entertained that the author of each paper on the program will immediately take steps looking to the prompt and thorough discussion of the thesis which he presents. The secretary would like to suggest to each author that he send a copy of his paper to some fellow-member for the purpose of having the member initiate the discussion of the subject. It is earnestly hoped that the discussions may be prompt, and lively and thorough. The program is short, but comprehensive, and there will be ample time for adequate discussion.

There are many reasons for believing that the coming meeting will be the largest and the best the Association has ever known. The former presidents all promise to meet with us again, as they did last year at Spartanburg.

A few invited guests of world-wide reputation will address the Association. Come to the meeting, and bring some of your medical friends along. All good physicians will be welcomed to all the sessions.

At the last meeting of the Association the secretary was authorized to limit the program to forty papers. He has taken the liberty of excluding from this number the Presidential Address and the papers presented by invited guests. The program, therefore, stands in complete form. If there are errors or omissions please communicate at once with the secretary.

Section 9: "Not more than twenty minutes will be occupied in reading any paper, except by a vote of the Association. In the discussion of papers, resolutions or questions, no member shall speak longer than five minutes nor more than twice on the same subject, except on special permission by a vote of the Association."

Space will be provided for the exhibition of ethical goods. Exhibitors should communicate at once with the Local Committee of Arrangements.

For further information call freely upon Dr. Southgate Leigh, Norfolk, Virginia, or

JAS K. HALL, M. D., Secretary-Treasurer, Richmond, Va.
W. W. FENNELL, M. D. President, Rock Hill, S. C.

The Assosiation of Seaboard Air Line Railway Surgeons

Celebrated their last annual meeting by a trip to Cuba, November 27 to December 2, and transacted all business on boat. It was decided to hold the next annual meeting in Norfolk, Va., and the following officers were elected: President, Dr. V. A. Brooks, Portsmouth, Va.: vice-presidents, Drs. A. G. Fort, Atlanta, Ga., L. A. Hartzog, Olar, S. C.: and secretary-treasurer, Dr. J. W. Palmer, Ailey, Ga.

Northampton County Medical Society.

At a recent meeting of this Society at Eastville, Va., the following officers were elected: President, Dr. Holland Trower, Eastville; vice-president, Dr. G. Fred Floyd, Bridgetown; secretary-treasurer, Dr. J. Mortimer Lynch, Cape Charles.

Dinwiddie County Medical Society.

The following doctors were elected members of the Dinwiddie County Medical Society at its December meeting: Drs. H. G. Turner, William A. Reese, and Mason Romaine, all of Petersburg.

WILLIAM C. POWELL, *Sec'y-Treas.*

The Lunenburg County Medical Society,

At its regular quarterly meeting, held in Kenbridge, January 12, elected the following officers: President, Dr. Edwin Mann, Kenbridge; vice-president, Dr. H. E. Whaley, Victoria; secretary-treasurer, Dr. Robert Whitehead, Meherrin.

Analyses, Selections, Etc.

Primary Carcinoma of the Female Bladder, With Report of a Case.

Dr. I. S. Stone, of Washington, in a paper read before the Southern Surgical Association at Pinehurst, N. C., in December, reported a case in which early excision of a supposedly malignant bladder tumor, by combined vaginal and abdominal operations, has resulted in an apparent cure.

CASE REPORT.

Miss ....., white, 63, single and virgin, came to see me in February, 1920, on account of an irritable bladder with bloody urine. She had always been healthy since childhood, weighed 150 pounds, had the appearance of good circumstances and had no vices. At the time of her visit she was passing bloody urine every day, which she thought uninfluenced by exercise. After she came under observation, we always found blood in specimens examined microscopically. She had not had any severe or alarming hemorrhage at any time. Blood examination showed 80 per cent. haemoglobin and no constitutional disease, with blood pressure 130 systolic. Her urine was normal apart from the usual epithelium, shreds and elements from the growth in the bladder. Pelvic examination gave little information. It was discovered that she always had residual urine in her bladder, generally about two ounces. With a Kelly cystoscope, a mass near the left ureteral orifice could be seen. This had a ragged surface and was dark red in color, which easily accounted for the bloody urine and irritable bladder. She had not suffered severe pain but was obliged to empty her bladder at intervals of a few hours. This circumstance I now believe was partly due to the inability to completely empty the organ. (Incidentally her bladder capacity was somewhat limited, being about ten ounces.) My colleague, Dr. G. Brown Miller, examined the patient at my request and gave an unqualified opinion that we had to deal with a malignant growth. He advised operative treatment.

The growth as seen through the cystoscope appeared to be about two centimeters vertically and not as wide as it was long. It was placed immediately adjoining the ureteral orifice, being rather more above than below that point. The outline was in sharp contrast to the adjoining mucosa, being abruptly projected out from the bladder wall, which was practically of normal appearance. The growth was sessile and answers well to the description of papillomatous carcinoma.

Preliminary Treatment.—In order to sterilize the mucosa as well as possible, a 2 per cent. solution of protargol was thrown in the bladder on alternate days for a time, the same treatment as that used in cases of chronic or persistent cystitis. It was seen that distention of the organ beyond a certain point always caused pain and increased bloody return.

The first steps of the operation were rather tedious, owing to the small size of the vagina. However, the anterior vaginal wall was opened in the median line and the bladder carefully and thoroughly separated from all attachments at its base, especially on the left of the median line and from the anterior surface of the uterus, an easy matter to those accustomed to the performance of vaginal hysterectomy or an interposition operation. The region about the ureter was thus investigated, the growth located, and its size estimated. Then the abdomen was opened and the operation completed from above.

I wish particularly to call attention to the ease with which the operation was completed after the base of the bladder was freed. We

could raise the organ considerably above its usual position and there was no special delay in the excision of the growth, as the ureter was easily brought into view. In this case the ureter was displaced slightly, but not entirely separated from its lateral attachments, and was sutured in position as the wound was closed. A line of small plain catgut sutures closed the bladder and were tied on the inside. A second row of number two catgut was added on the outside but under the peritoneal cover. A drain tube provided with fenestra was sutured to the anterior wall of the uterus and brought into the vagina to act in case of leakage, possible infection or hemorrhage. As a matter of fact, there was need of this which we did not expect, for a small amount of urine escaped through it for more than a week. A self retaining catheter was placed in the bladder. Although this catheter was doubtless retained within the bladder it is almost a certainty that its lumen was allowed to get closed and the leakage was due to that mishap. However, there was at no time any serious delay in the patient's recovery. Complete and satisfactory wound closure proceeded rapidly and without infection. The bladder functionated satisfactorily in ten days.

The wound in the bladder extended from the apex to a point well below the left ureteral orifice and the growth excised with scissors, leaving a good margin of healthy tissue outside of the involved area. The pathologist of the hospital reported an epithelioma. No treatment was required for cystitis and, although the patient has been kept under my observation for a year and eight months, no untoward symptom has occurred and her urine is normal. (*Am. Jour. Obst. & Gyn.*)

Correspondence

Tuberculin Testing of Dairy Cows:

Lynchburg, Virginia,
January 19, 1922.

To the Editor:—

In a communication to the January issue of the Virginia Medical Monthly on my paper before the State Medical Society, Dr. P. S. Schenck, Director of Public Welfare and Health of Norfolk, misconstrues my statement regarding the tuberculin testing of cows. I did not state that Lynchburg had the first ordinance on tuberculin testing of dairy cows. What I did state was that Lynchburg was the first city to drink milk *all* of which came from tuberculin tested cows. When the Lynchburg ordinance was written, the health officials had before them a number of municipal ordinances requiring that milk *sold* in the city had to be drawn from tuberculin tested cows, or had to be pasteurized. The Lynchburg ordinance went further and required in addition to the dairy cows outside of the corporate limits that all cows, private as well as public, kept in the city, whether the owners sold milk or not, had to be tested. The theory was that from a public health view point it was as important to have the milk used by the owner of the family cow free from tuberculosis as to have that sold to other persons. Pasteurization at that time in the city was unsatisfactory and, therefore, was not accepted as a substitute for testing. The result was that all cows from which milk was drawn for use in Lynchburg were tested. What is more and what is of very great importance, the testing was checked up by government experts, and thus much unreliable work by private veterinarians was avoided as many other cities of the country and even of Virginia have found out.

I note with interest and surprise the statement of Dr. Schenck that Norfolk adopted an ordinance requiring tuberculin testing in March 1901. Bulletin No. 46, Bureau of Animal Industry, United States Department of Agriculture, of date 1903, two years later, page 159 states:

"Norfolk. (Population, 46,624).

"(For comparison with other cities in Class III, see p. 38.)

"A. P. Pannill, secretary of the board of health.

"This city has no milk ordinance and no milk inspector, and does not exercise supervision over the milk supply," and on page 38 says in reference to Norfolk, "No inspectors and no records; can get no facts."

S. H. Rosenthal, M. D.

Washington, D. C.
1124 New Hampshire Ave.
January 21, 1922.

To Dr. Mosby G. Perrow,
Director of Public Welfare,
Lynchburg, Va.

The statement appearing in the December issue of the Virginia Medical Monthly to

the effect that "Lynchburg was the first city to drink milk all of which came from tuberculin tested cows" was a true statement of fact. At the time of applying the tests at Lynchburg, Dr. T. A. Ladson, now in charge of work in the State of Maryland, assisted me. About two years later, Drs. Benner and Van Ness, Bureau Inspectors, commenced working at Norfolk, and Newport News, and Dr. Van Ness reported some very interesting experiences in that section. Lynchburg was beyond doubt the pioneer city of America to eradicate the disease from its herds, and the co-operation between your city, the breeders and owners of cattle, and the Bureau was remarkably satisfactory, as was the general co-operation in Virginia generally. Dr. Rosenthal's article is highly appreciated by me.

(Signed) FRANK I. WINANT,
Veterinarian, Bureau of Animal Industry.

The Truth About Medicine

During December the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Non-official Remedies:

The Abbott Laboratories:
Neocinchophen-Abbott.
Powers-Weightman-Rosengarten Co.:
Mercury and Potassium Iodide—P. W. R.
Schimmel and Co.
Oil of Cypress-Schimmel and Co.
E. R. Squibb and Sons:
Liquid Petrolatum-Squibb.
Food Allergens-Squibb.
Pollen Protein Allergens-Squibb.
Animal Epidermal Extract Allergens-Squibb.
Bacterial Allergens-Squibb.
Winthrop Chemical Co.:
Chaulmestrol
Nonproprietary Article:
Chaulmoogra Oil.

Change of agency: Cresatin.—The council has directed that the description of Cresatin (New and Non-official Remedies, 1921, p. 94) be revised to show that the name has been changed to Cresatin—Dr. N. Sulzberger, and that it is manufactured by the Intravenous Products Company of America, Inc.

Book Announcements

The Blood Supply of the Heart. In Its Anatomical and Clinical Aspects. By LOUIS GROSS, M. D., C. M., Douglas Fellow in Pathology, McGill University, and Research Associate, Royal Victoria Hospital, Montreal, with an introduction by HORST OERTEL, Strathcona Professor of Pathology, McGill University, Montreal. Paul B. Hoeber. New York. Large 8vo. 171 pages. With 29 full plate illustrations and 6 text illustrations. Cloth. Price, $5 net.

The Glands Regulating Personality. A Study of the Glands of Internal Secretion in Relation to the Types of Human Nature. By LOUIS BERMAN, M. D., Associate in Biological Chemistry, Columbia University; Physician to the Special Health Clinic, Lenox Hill Hospital, New York. The Macmillan Company. 1921. Cloth. 8vo. 300 pages.

Medical and Surgical Reports of the Episcopal Hospital of Philadelphia. Edited by ASTLEY P. C. ASHHURST, M. D., Vol. V. Philadelphia. Press of William Dornan. 1920. 506 pages. Cloth.

Ephraim McDowell, "Father of Ovariotomy" and Founder of Abdominal Surgery. With an Appendix on **Jane Todd Crawford.** By AUGUST SCHACHNER, M. D., F. A. C. S., Louisville, Ky. Philadelphia and London. J. B. Lippincott Company. 1921. 8vo. 331 pages. Cloth. Price $5.00.

Cosmetic Nostrums and Allied Preparations. Part I, Preparations for the Skin. Part II, Preparations for the Hair. Part III, Deodrants, Depilatories, etc. 46 pages.

"Deafness Cures." 43 pages. Both of these pamphlets are issued by the PROPAGANDA DEPARTMENT of the JOURNAL OF THE A. M. A., as part of its work in giving the public the facts regarding the nostrum evil and quackery. Paper, 15 cents each.

New Hospital at Beckley, W. Va.

The King's Daughters' Hospital was opened at Beckley, W. Va., January 24, for the admission of patients. At present it can accommodate forty patients. The new building, which is of native stone and is modern in every respect, will accommodate 75 patients. It will have full time laboratory technicians and, in every respect, will come up to the standard required by the National Hospital Association.

Dr. B. B. Wheeler, former surgeon of McKendree Hospital, McKendree, W. Va., and for five years chief surgeon of the C. & O. Hospital, at Clifton Forge, Va., is surgeon and chief of the staff.

Civil Service Examinations.

The U. S. Civil Service Commission, Washington, D. C., announces open competitive examinations for consulting public health nurse, applications to be received until March 7, 1922; for supervisor of protective social measures, and field agent in protective social measures, applications to be received until further notice. Examinations are open to both men and women. Full information should be obtained from above named commission.

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B. R. TUCKER, M. D., Richmond, Va.
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ALEX. G. BROWN, Jr., M. D.,
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G. H. WINFREY,
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Editorial

Quinidin Sulphate in Auricular Fibrillation.

Hewlett and Sweeney[1] conclude: (1) Quinidin will restore a normal heart rhythm in a certain proportion of auricular fibrillation; (2) recent onset of the fibrillation favors restoration of a normal rhythm; (3) with a return to normal rhythm, the general condition of the patient is generally improved, and occasionally there is a striking improvement even when digitalis has failed to maintain compensation; (4) on the other hand, quinidin may, in certain cases, produce alarming symptoms and may, during administration, have an unfavorable influence on compensation; (5) in view of the possible dangers associated with its administration to cardiac patients, quinidin should be given only after decompensation has been treated by other methods, after an exact diagnosis of the cardiac condition has been made, and when the patient is kept under careful observation; (6) combinations of quinidin and digitalis should probably be avoided.

It is thought by Oppenheimer and Mann[2] that quinidin acts by depression of irritability and of conduction in the fibrillating auricle and, thus, tends to lessen the frequency and complexity of auricular fibrillatory contractions. In this manner, normal rhythm may result. It would seem that this view has corroborative evidence in the observation that fibrillation usually appears in hearts of increased irritability and rate.

It is rather accepted clinically that quinidin often restores to normal rhythm perpetually irregular hearts. How much the patient is really benefited by this restoration is a matter somewhat under discussion. It is quite true that the improvement of these cases may depend upon the essential nature of the cardiac defects producing or associated with the fibrillation. Cases resulting from strain or toxemia are more favorable for a permanent improvement than cases having underlying causes of a fixed nature, as valvular defects, arteriosclerosis and myocardial changes. Nevertheless, this drug seems (1) to exert a regulating effect on auricles and in this way favors the forcing of blood to the ventricles, (2) tends to cause the auriculo-ventricular valves to be in better position for closure at the begining of ventricular contraction, (3) and causes the ventricular musculature to be under slightly increased tension at the moment of contraction, thus insuring optimal conditions for the propulsion of blood. This tends to bring about more regular systoles and, in turn, better ordered cardiac mechanism.

Method of Administration: Because some patients are apparently unfavorably affected and because only a certain percentage of cases have been benefited, and because some have had decidedly bad results (fatalities having been reported), it is exceedingly important to proceed cautiously in its administration. In case of recognized auricular fibrillation, a preliminary small dose is recommended for the first dose. This may be 3 grains, three or four times the first day; after this, 6 grains, three times a day and increased to four times a day may be given. One should not give over thirty grains daily.

Untoward results may appear in the form of loss of appetite, slight nausea, vomiting, palpitation, increased heart rate, a small soft pulse, fainting, cyanosis, apnea. Fatality may occur; this is true in decompensated hearts.

Caution in the use of a new remedy is wise. The eagerness, with which a physician welcomes a new drug that comes into use with a reputation for controlling symptoms that have so long perplexed and harrassed him, is very

1 The Quindin Treatment of Auricular Fibrillation: Hewlett & Sweeney. J. A. M. A., Dec. 3, 1921, p. 1792. (Vol. 77, No. 23.)

2 Clinical Experience with Quindin in Auricular Fibrillation: Oppenheimer & Mann. J. A. M. A., Dec. 3, 1921, p. 1800 (Vol. 77, No. 23.)

natural, if it is wanting in true scientific poise and deliberation. The presentation of quinidin as a heart drug with peculiar power upon the wild and delirious auricle rightly arrests attention. But caution in its use should be exercised and the proper cases for its application should be intelligently selected.

Bronchopneumonia.

The diagnosis of bronchopneumonia is not always easy in the early stages of the disease. The physical signs are not uniform. Radiograms of these cases show the reason for the variableness of physical signs. The presence of small discrete areas may not produce signs much at variance from those commonly elicited in bronchitis. The rales and relative variability of the breath sounds and the persistence of fever in bronchitis cases may be sufficient reason for expecting bronchopneumonia. As the advanced stages are met, one may be able to make out small areas of consolidation but, unless this condition obtains in the periphery, impairment of resonance and a clear cut alteration in the breath sounds may be difficult to obtain. Fleeting, migratory and changing physical signs may be expected as areas of lobular pneumonia proceed. The incidence of bronchopneumonia is common; more common than we are prone to think. Some of the cases of acute bronchitis that seem rather resistant to treatment are cases of bronchopneumonia. The patient with a persistent bronchial cold and fever is, not infrequently, a pneumonia with discrete areas. Some of these cases, not properly cared for or managed, may go on to a group of sequelae more or less serious and permanent. There may ensue from such cases pleurisy and emphysema, lung abscess, and the lighting up of a tubercular process previously quiescent.

In addition, one of the most serious and common complications relates to the effect upon the heart. The writer has frequently observed lamentable appearance of the symptoms of myocarditis in cases of bronchopneumonia, particularly cases not well protected in the post febrile stage. The appearance of breathlessness and the softening of the heart sounds, an occasional systolic murmur at the apex increased on exertion, may be evidence of a smitten heart muscle that has been thoroughly poisoned and that may never again return to normal strength or power of endurance.

Splenic Anemia: Banti's Disease.

Splenic anemia, or Banti's disease, is a condition that involves the blood, the spleen and the liver; there is a low red blood count, a low percentage of hemoglobin, and a leukemia: there is an enlarged spleen; and there is (as described by Banti in 1883) associated portal cirrhosis of the liver.

The clinical evolution is somewhat confused. its etiology is not known. Th eclassification its etiology is not known. The classification of this disease is difficult because the history and physical findings in cases of splenic anemia and enlarged spleen often vary as to the initial symptoms and as to the order of appearing in the clinical picture. Mayo* has recently stated this point in this manner: "Most observers are now of the opinion that Banti's disease is merely a late stage of splenic anemia, presuming that the etiologic agents which are removed by the spleen from the blood stream affect not only the spleen but also the liver terminally. As we discover one by one the various initiating causes of these change in the spleen, the number of Banti's syndrome is reduced. Banti no only laid stress on unknown etiology but also on the terminal changes in the liver."

The anemia varies in degree. Following a gastric or esophageal hemorrhage, the red blood cells get as low as two million and the percentage of hemoglobin to 20%: during the quiescent stage, the red cells may go to, nearly if not, normal number, while the hemoglobin improves but does not reach normal. The count of white blood cells is usually low, one case in the service of the writer remaining constantly about 1,600 cells.

The spleen is enlarged, adherent, nodular, and hard. There is evidence of biliary cirrhosis; there may be ascites; their may be history of gastric hemorrhage and the patient appears to be pale and weak. Death is caused usually not by the hemorrhage but by portal and splenic circulatory obstruction and ascites. Heart failure ensues, if hemorrhage does not terminate the condition.

Dr. H. M. Miles

Has just returned to his home at Norton, Va., after doing special eye work at Knapp Memorial Eye Hospital, and ear, nose and throat work at Roosevelt Hospital, New York City.

*William J. Mayo, Jour. A. M. A., July 2, 1921.

News Notes

Influenza and Pneumonia.

Although New York city is experiencing an outbreak of pneumonia and influenza, there appears to be as yet no unsual prevalence of these diseases up-state, according to the reports reaching the State Department of Health of New York. Furthermore, telegraphic reports to the Department from several State health departments indicate that there is no epidemic of influenza or pneumonia in those states. It is true, however, that the reports from New York city show a considerable recent increase both in cases reported as influenza, and in cases and deaths from pneumonia, although the disease is of a milder type than the 1918 epidemic. Past experience shows that any marked increase of these diseases in New York city is likely to be followed within a short time by similar outbreaks in other communities. For this reason, health departments throughout the country are on the alert.

Through *U. S. Public Health Reports* we note that influenza is prevalent in several parts of England and is spreading. There, as in this country, the disease is of milder type than the 1918 epidemic. Broncho-pneumonia is reported as the chief complication. Outbreaks similar to that in England are reported also from continental Europe, and British authorities believe a further general spread is probable. According to German newspaper reports, hospital facilities in Berlin have been overtaxed with the care of influenza patients.

The Tri-State Medical Association of the Carolinas and Virginia

Is to hold its twenty-fourth annual session in Norfolk, Va., February 22nd and 23rd, under the presidency of Dr. W. W. Fennell, of Rock Hill, S. C. Dr. James K. Hall, of Westbrook Sanatorium, Richmond, Va., is secretary, and Dr. Southgate Leigh, Norfolk, Va., chairman of the Norfolk Committee of Arrangements. The program appears on page 663, under Society Proceedings. It is hoped that after reading the program you may decide to attend and, if not already affiliated, to become a member of the Association.

St. Louis Meeting of the American Medical Association.

The May meeting of the American Medical Association at St. Louis promises well toward being the largest in attendance of any of the Association's sessions. Since the publication of the hotels in the Journal of the Association in December, inquiries and reservations are being made daily. The hotels and the Convention's Bureau are aiding the Committee in a most satisfactory and helpful way to see that the fellows are comfortably housed and accommodated. The A. M. A. meetings tax all cities entertaining them to the limit of hotel capacity. Whenever possible, a good fellow should double up so that no one is left without comfortable lodging.

Reservations should be made by communicating direct with the hotels. If satisfactory arrangements cannot be made in this way, write to Dr. Louis H. Behrens, Chairman Committee on Hotels, 3525 Pine Street, St. Louis, Mo.

Bill Introduced Looking to Increase in Number of State's Rural Doctors.

Delegate Wilbur C. Hall, of Loudoun, has introduced in the House of Delegates, bills authorizing the boards of visitors of the Medical College of Virginia and the University of Virginia to offer two scholarships from each congressional district, which shall entitle the holder to tuition in the department of medicine of each institution and to $250 annually. The bill provides that the scholarships shall be assigned, after competitive examination, to the two persons in each congressional district making the highest grades. The bills give each institution twenty scholarships.

It is further provided that each of the students after graduation shall practice medicine for a period of not less than five years in the rural section of the congressional district from which he or she was appointed, and if the person violates the agreement to practice medicine in the rural district after graduation, authority be vested in the University of Virginia and the Medical College of Virginia to collect by law such amount as the student has received from the scholarship.

Each bill appropriates $5,000 for each of the years ending February 28, 1923, and 1924, to carry out the provisions in each measure.

Federal Aid For Maternity.

Twenty-two states have to this time accepted the federal aid for maternity care authorized in the maternity act. Five of these, Delaware,

Minnesota, New Hampshire, New Mexico and Oregon, have accepted by action of their legislatures, while seventeen have done so through their governors, under the provision of the bill permitting such acceptance within a period of six months after the next legislative session following its enactment.

The states accepting receive, under the bill, $10,000 for the fiscal year ending next June 30, and $5,000 in succeeding years, with an additional $5,000 and a proportional share of $710,000 based on population of the state, if these amounts are matched by state appropriations. The aid is conditioned on approval of plans for its use by the federal board.

Dr. S. W. Maphis

Has returned to his home in Warrenton, Va., after a visit to New York city.

Time For Income Tax Again.

There have been some changes in income tax laws since last year. Those now required to make a return are "single persons who had a net income of $1,000 or more, or gross income of $5,000 or more. Married couples who had net income of $2,000 or more, or gross income of $5,000 or more."

March 15, 1922, is the final date for filing returns and making the first payments. These shall be made to the collector of internal revenue for the district in which the person lives, or has his principal share of business. Full directions may be had from Form 1040A and Form 1040, to be obtained at above named source.

Exemptions provided by revenue act of 1921 are $1,000 for single persons, and $2,500 for married persons whose net income was $5,000 or less, and $2,000 for married persons whose net income was $5,000 or more. Under the revenue act of 1918, the personal exemption allowed a married person was $2,000, regardless of the amount of net income. The personal exemption allowed a married person applies also to the head of a family, man or woman, who supports in one household one or more relatives by blood, marriage or adoption. Exemption for all dependent children under 18 years of age is increased from $200 to $400.

The rate is 4% normal tax on taxable income up to $4,000 in excess of exemption; 8% normal tax on balance of taxable income; surtax from 1% to 65% on net incomes over $5,000 for the year 1921.

Dr. and Mrs. A. W. Rusmiselle

Have returned to their home at Waterford, Va., after a visit to Frederick, Md.

Dr. G. G. Painter,

Pulaski, Va., has been elected one of the directors of the People's National Bank of that place.

Bank Directors.

Drs. J. H. Smoot and W. C. Ford, of Woodstock, Va., have been elected members of the board of directors of the Shenandoah National Bank in Woodstock.

Lincoln Hospital Destroyed by Fire.

Thirty patients were removed to safety, when Lincoln Hospital for colored people, Durham, N. C., was destroyed by fire on January 26. The loss was estimated at between $10,000 and $15,000. It is understood that the hospital will be rebuilt at a cost of $100,000, funds for new buildings having been raised sometime ago.

Dr. George P. Hamner,

Lynchburg, Va., has been elected president of the Piedmont Field and Stream Club for the year 1922.

Dr. Frank S. Johns

Has been elected president of the Richmond alumni of the Kappa Alpha Fraternity.

Dr. J. W. Holmes

Pulaski, Va., has been elected chaplain of the Pulaski County Camp of Confederate Veterans, for the ensuing year.

Dr. W. Brownley Foster,

Roanoke, Va., was a recent visitor to this city.

Richmonders Live Longer Than Formerly.

Figures given by the Bureau of Health of Richmond show that the average years of life in this city have increased from 24 in 1872 to 40 in 1921. Reduction in number of deaths from communicable diseases is one of the factors which has helped in this extension of life. The Bureau states that the age limit is yet too low and it will endeavor to raise this age to 50 within the next decade.

The National Health Council

Held its annual meeting in Washington, D. C., January 5, at which time Dr. Livingston Farrand, president of Cornell University, was elected chairman for the year 1922.

Use of Alcohol in Practice of Medicine.

To get the opinion of physicians as to the use of alcoholic beverages in the practice of medicine, the American Medical Association recently sent questionnaires to 53,900 physicians. Fifty-eight per cent. of these were returned. From the the returns, the Association tabulated results which show that 51% regarded whiskey as a necessary therapeutic agent in the practice of medicine, while only 26% regarded beer and 32% wine as necessary therapeutic agents in their work.

Dr. and Mrs. James B. Abbitt,

Norfolk, Va., recently visited their former home, Appomattox, Va.

Dr. and Mrs. Mark W. Peyser,

Of this city, celebrated the twenty-fifth anniversary of their wedding on the 27th of January.

Dr. Bernard H. Kyle

Has returned to his home in Lynchburg, Va., after doing special work in orthopedic surgery in Boston. His offices are in Wall Building.

Dr. H. S. Belt,

South Boston, Va., is out again, after an illness of several months. He is leaving shortly for a visit to friends in Florida.

Dr. and Mrs. William R. Aylett,

Newport News, Va., have been recent visitors in this city.

Johnston Willis Sanatorium to Commence on New Building Soon.

The Johnston-Willis Sanatorium property, at the corner of Franklin and Sixth Streets, this city, has been sold to the Foreign Missions Board of the Southern Baptist Convention for $100,000, but possession will not be given for two years. By that time, Dr. Murat Willis and the physicians associated with him will have erected a more modern and fireproof hospital at Kensington Avenue and the Boulevard, facing the Confederate Battle Abbey. The site was acquired several years ago but the building has been held up owing to the high cost of building materials.

Dr. F. Musgrave Howell,

Recently located at Big Island, Va., has now moved to Lynchburg, R. F. D. No. 4, Va.

A. M. A. Committee on Gorgas Memorial.

In accordance with a request received from the Gorgas Memorial Institute of Tropical and Preventive Medicine of Panama, Dr. Hubert Work, president of the American Medical Association, has appointed a committee composed of Drs. George E. de Schweinitz, of Philadelphia, Charles W. Richardson, of Washington, and Fred B. Lund, of Boston, to co-operate with the officers of the organization.

This memorial to General Gorgas is to be established in the city of Panama for research and the extension of means of prevention of tropical diseases. Credit for the conception of this memorial belongs to Dr. Belisario Porras, president of the Republic of Panama, who, in the name of the government, has tendered the site, a building and all required equipment, valued at approximately $500,000.

Deaths of Physicians in 1922.

According to reports already compiled, the *Journal of the A. M. A.* estimates that there were slightly over 2,300 deaths among the 160,000 physicians of the United States and Canada, during 1921, or a rate of 14.65 per 1,000. The ten year period in which occurred the largest number of deaths was 61 to 70, and the largest number of deaths for a given age was 66, there being 71 deaths noted at this age. Figures would seem to indicate that doctors are a long lived profession. There were 571 deaths between 61 and 70; 393 between 71 and 80; 240 between 81 and 90; 17 between 91 and 100, and 1 at the age of 101. The largest number of deaths was from diseases of the heart and circulatory system.

The Congress on Medical Education, Licensure, Public Health and Hospitals

Will hold its annual conference in Chicago, with headquarters at Congress Hotel, March 6 to 10, inclusive. Dr. Theodore Hough, of the University of Virginia, is president of the Association of American Medical Colleges and will deliver his address on Tuesday, the 7th.

The Standardization of Biological Stains.

The need of standardizing stains for biological uses has become increasingly evident during the last four or five years. During this period German stains have been either difficult to obtain or entirely unavailable; and the American products, although often excellent, have varied so much one from another as to

give uncertain results. The manufacturers have been willing to meet the demand of biologists, but the latter have generally been uncertain just what they wanted. Recently other societies have offered to assist in the work, many of the men concerned expressing a wish not to try to duplicate the Grubler stains, but to secure domestic stains better than their foreign predecessors.

The interest thus awakened led to a conference under the auspices of the National Research Council, on November 5, 1921, at the Chemists Club, New York City, to discuss the standardization of biological stains and the steps to be taken to develop a reliable American supply of these.

Dr. James Morrison

Has been elected president of the Lynchburg, Va., chapter of the University of Virginia Alumni for the year 1922.

Dr. McGuire Awarded Service Medal.

Dr. Stuart McGuire, of this city, has been awarded the distinguished war service medal by the U. S. Government for meritorious services as commanding officer of Base Hospital No. 45. The presentation was made at Fortress Monroe with full military ceremonies. War department records showed that his was the most efficient unit in France, though manned almost entirely by former civilians.

Dr. J. M. Burke Honored.

Dr. Joseph M. Burke, Petersburg, Va., chief surgeon for the Seaboard Air Line Railway, was recently tendered the position of professor of materia medica in a southern medical college but declined for personal reasons.

Dr. and Mrs. John W. Carroll

And daughter, of Lynchburg, Va., returned home early in January from a trip to Indianapolis.

Dr. and Mrs. Junius F. Lynch,

Norfolk, Va., were visitors in this city the middle of January.

Married.

Dr. Edgar A. Pole, Hot Springs, Va., and Mrs. Alice Clarke, of Charlottesville, Va., early in January.

Hilltop Sanatorium to Open Shortly.

The Danville Masonic lodges will fully equip one of the rooms at Hilltop Sanatorium, the new tuberculosis sanatorium to be opened shortly in Danville, Va. Some other local societies are planning to equip other rooms.

The Red Cross Courier

Made its initial appearance in January as the official journal of the American Red Cross. It is published in Washington, weekly, and takes the place of all bulletins previously published by national and divisional headquarters.

Dr. J. Ross Hunter,

An alumnus of the Medical College of Virginia, who has been specializing in surgery in Huntington, W. Va., has been appointed surgeon in charge of Sheltering Arms Hospital, at Hansford, W. Va.

Dr. R. E. Mitchell,

Of this city, is taking a post-graduate course in eye, ear, nose and throat work at the Brooklyn, N. Y., Eye and Ear Hospital.

The Richmond Tuberculosis Association

Held its annual meeting on February 2, at which time a good report was made of work during the past year. Dr. Garnett Nelson was re-elected president and the following doctors, in addition to Dr. Nelson, were made directors: Drs. P. D. Lipscomb, N. T. Ennett, C. C. Hudson and E. C. L. Miller.

Doctors Officers in Lions Club.

Dr. J. McCow Tompkins was elected a member of the board of directors and Dr. Dorsey G. Tyler lion tamer of the Lions Club recently organized in Richmond. Mr. G. H. Winfrey, secretary of the Medical Society of Virginia, was elected secretary of this new organization.

Dr. H. Taylor Hawkins,

Clover, Va., has been made commander of Clover Post No. 110, American Legion.

Dr. L. H. Apperson,

Recently of Victoria, Va., is now located at Old Church, Va.

Dr. B. F. Butler

Has moved from Newport News, Va., to Cooper, N. C.

Infant Mortality Rates Lowered in 1921.

Reports received through the Bureau of Census to this time indicate record low rates for infant mortality throughout the country last year. No city shows a higher rate for

1921 than for 1920, though two have the same rate. The lowest infant mortality rate was 47 per 1,000 births, the highest 111 per 1,000. The only Virginia cities listed in this report were Norfolk and Richmond, with rates of 82 and 101 per 1,000, respectively.

Location With Small Acreage For Doctor or Any One Wanting Farm With Small Acreage.

This property is in the western part of the State in a village of about 150 to 200 inhabitants, and on a railroad. The practice is practically unopposed. The property consists of an 8-room house in good condition, well under shelter; an office, barn for six horses, garage, corn crib, and other out-buildings on 30-acre tract with about 70 fruit trees beginning to bear. It is within half a mile of two churches, store block, smith shop, Masonic hall, school (2 rooms) in front of house, and garage across the road. Can be bought for $5,500 on the right kind of terms. Write "T. A. G.", care this journal. (Adv.)

For Sale.

Office equipment of the late Dr. D. A. Kuyk, who specialized in diseases of the eye, ear, nose and throat. For detailed information, communicate with Dr. M. P. Kuyk, Bellevue Park, Richmond, Va. (Adv.)

Wanted.

Non-assembled examinations will be held to establish lists of persons eligible for appointment to vacancies in the following classes of positions in the service of the State of Maryland. Application blanks and full information as to the requirements, duties, etc., may be secured from the State Employment Commission, 22 Light Street, Baltimore, Md. Assistant Physician (Mental Diseases), $1,500 to $1,800 and maintenance; Assistant Physician (Tuberculosis), $1,140 to $1,500) and maintenance; Deputy State Health Officer, $3,000. (Adv.)

Obituary

Dr. George L. Clark,

Of Clarkton, N. C., died January 24, after a short illness with pneumonia. Dr. Clark retired from practice about two years ago after being in active work for forty-two years. He graduated in medicine from the University of New York in 1876. He is survived by his wife and several children, two of whom are Drs. Eugene S. and DeWitt D. Clark, both alumni of the Medical College of Virginia.

Dr. James Shelbourne Ewing,

Of Jonesville, Va., died January 6, at the age of 46. He was graduated from the Louisville, Ky., Medical College in 1903 and was at one time a member of the Medical Society of Virginia.

Dr. Fletcher Drummond,

One of the oldest and most prominent physicians of Accomac County, Va., died about the middle of January, at his home at Parksley, after a brief illness. He was 74 years of age and a graduate of Jefferson Medical College, Philadelphia, in 1869. He was engaged in active pracice over a period of fifty-five years, and until within a few weeks of his last illness. He was a member of the Medical Society of Virginia.

Dr. Floyd J. Gregory,

Of Keysville, Va., died from pneumonia, at Victoria, Va., January 20, at the age of 46. He was a well known physician of the Southside, but had not been in active practice recently, owing to bad health. He graduated from the Medical Department of Vanderbilt University, at Nashville, Tenn., in 1901, and was a member of the Medical Society of Virginia. Several sisters and brothers survive him. The interment was made at Keysville.

Dr. William Phillips Carr,

Formerly of Washington, D. C., died from heart disease December 27, at his home at Summit Point, W. Va. He was 63 years of age and graduated from George Washington University Medical School, Washington, in 1888. He had been professor of clinical surgery in this school since 1906. Dr. Carr was well known in this State and was for a number of years a member of the Medical Society of Virginia.

Dr. Joseph MacDonald, Jr.,

Founder and managing editor of the American Journal of Surgery, died suddenly from cerebral hemorrhage, on January 7, at his home in East Orange, N. J. He was 51 years of age and a graduate in medicine from the University School of Medicine, Baltimore, in 1904. He was identified with a number of medical associations, among them the American Medical Editors' Association, of which he was an ex-president and for many years secretary.